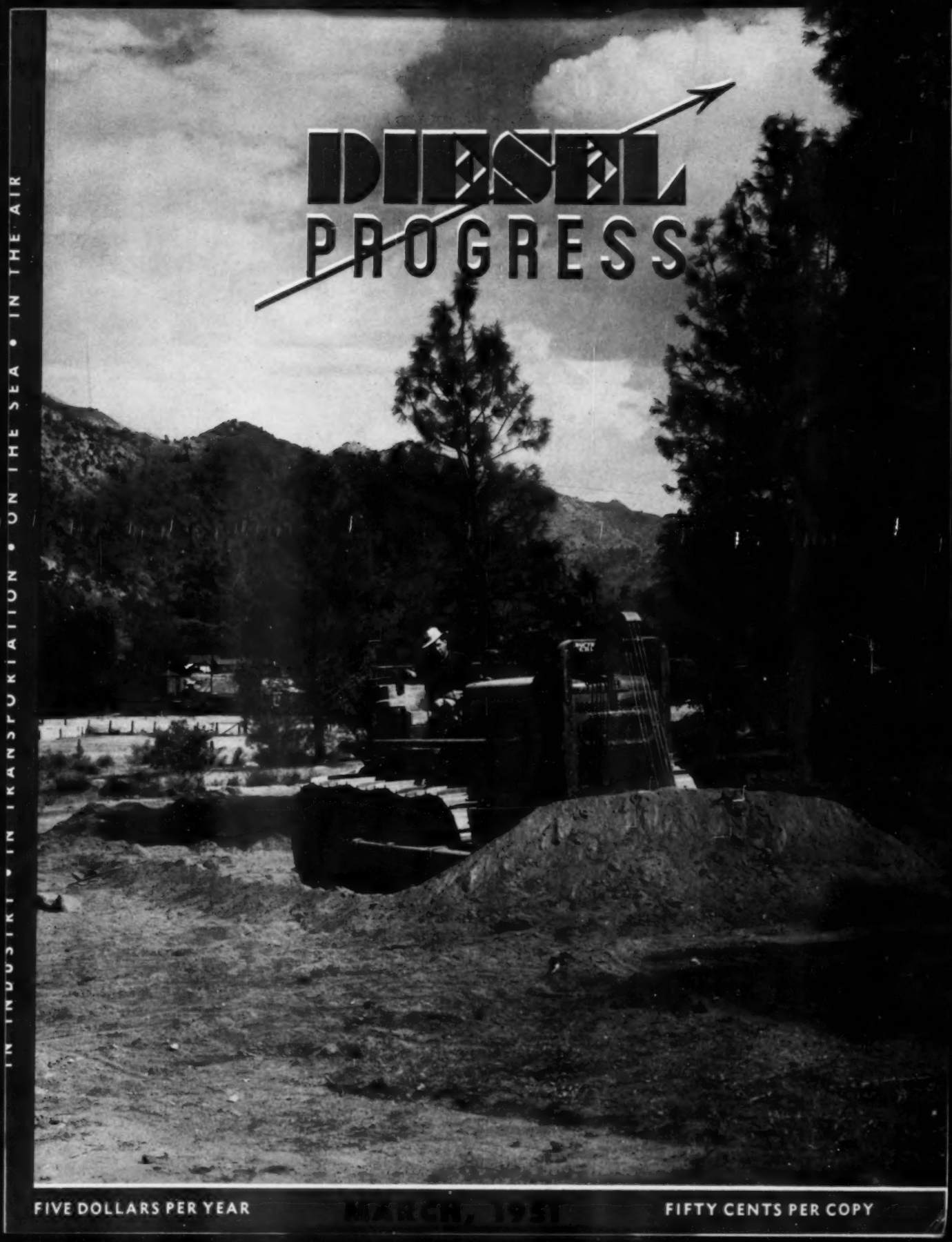
DIESEL
PROGRESS
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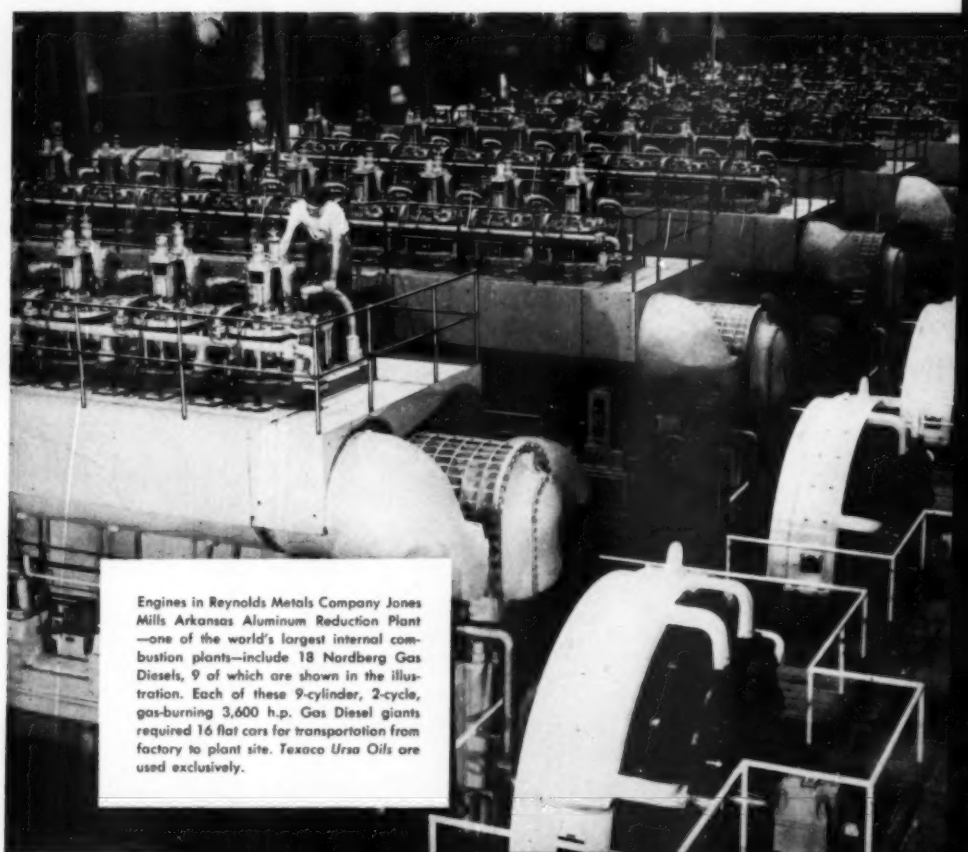
100% TEXACO-



Engines in Reynolds Metals Company Jones Mills Arkansas Aluminum Reduction Plant —one of the world's largest internal combustion plants—include 18 Nordberg Gas Diesels, 9 of which are shown in the illustration. Each of these 9-cylinder, 2-cycle, gas-burning 3,600 h.p. Gas Diesel giants required 16 flat cars for transportation from factory to plant site. *Texaco Ursa Oils* are used exclusively.

TUNE IN . . . TEXACO presents **MILTON BERLE** on television every Tuesday night. **METROPOLITAN OPERA** radio broadcasts every Saturday afternoon.

TEXACO

TEXACO

DIESEL PROGRESS for March, 1951, Volume XVII, Number 3. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rate: $5 per year, single copy 50c. Acceptance under 34.64, P. L. & R., authorized.

PLANT GAS DIESELS LUBRICATED

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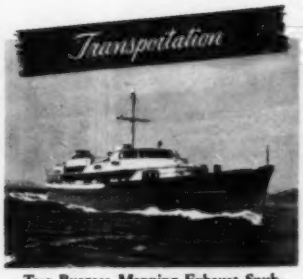
Texaco Ursa Oils are approved by leading engine manufacturers. When you change to Texaco, you'll join the large group of satisfied Texaco users, as witness the fact:

More stationary Diesel h.p. in the U.S. is lubricated with Texaco Ursa Oils than with any other brand.

Let a Texaco Lubrication Engineer help you to get better engine performance with the *Texaco Ursa Oil* best suited for your operation. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N.Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Burgess-Manning Snubbers on gas booster engines at a Louisiana station.



Two Burgess-Manning Exhaust Snubbers installed on this yacht.

Burgess-Manning Snubbers on compressors at a manufacturing plant.

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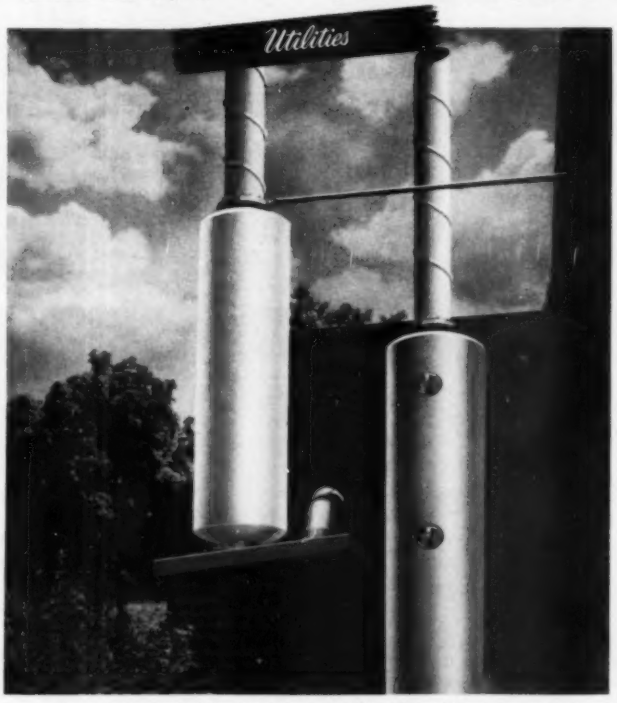
Build Good Will in Plant and Community — Provide Quiet Surroundings... with Burgess-Manning Snubbers



Burgess-Manning Snubbers installed at a Michigan diesel electric power plant.

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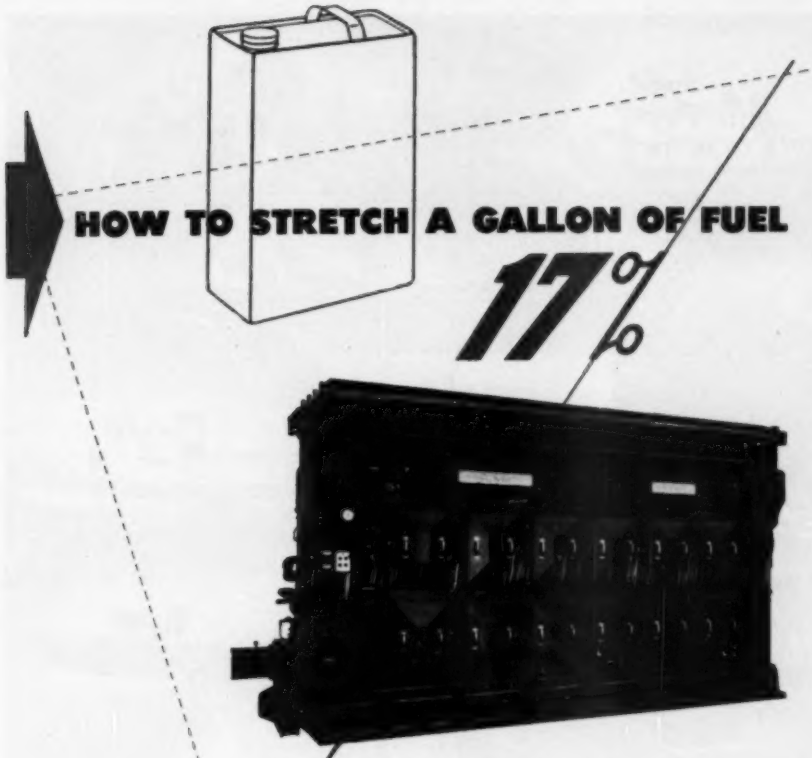

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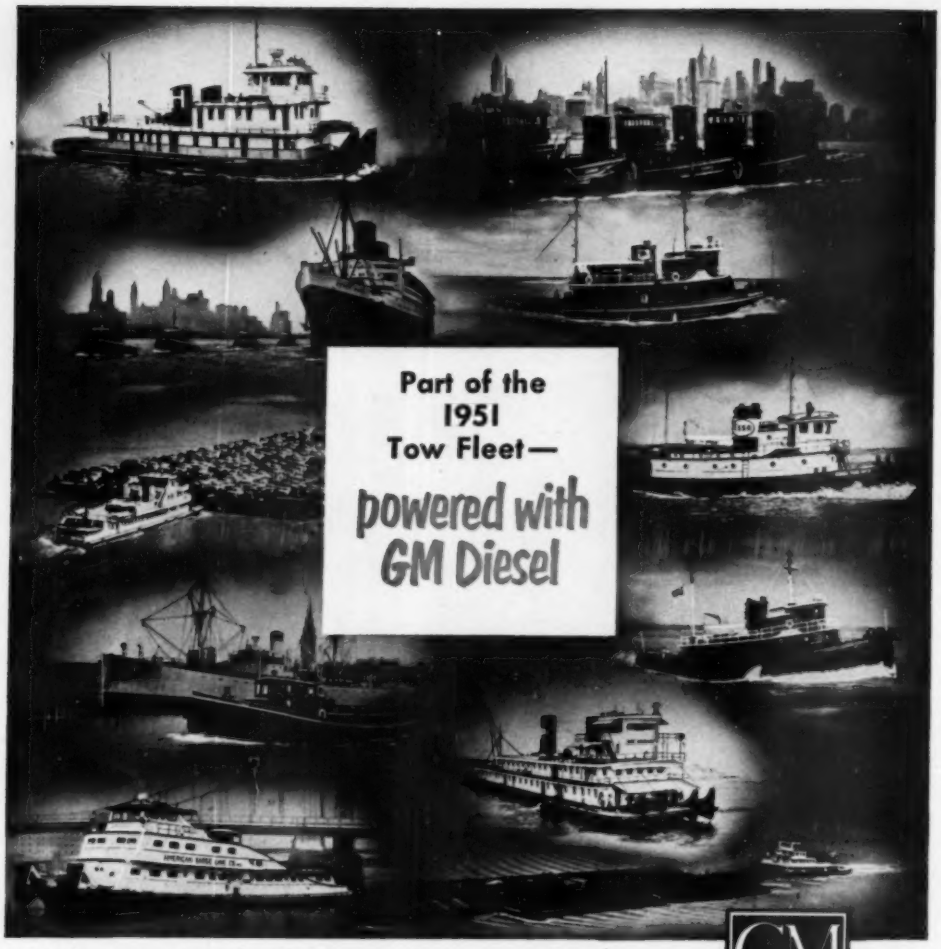

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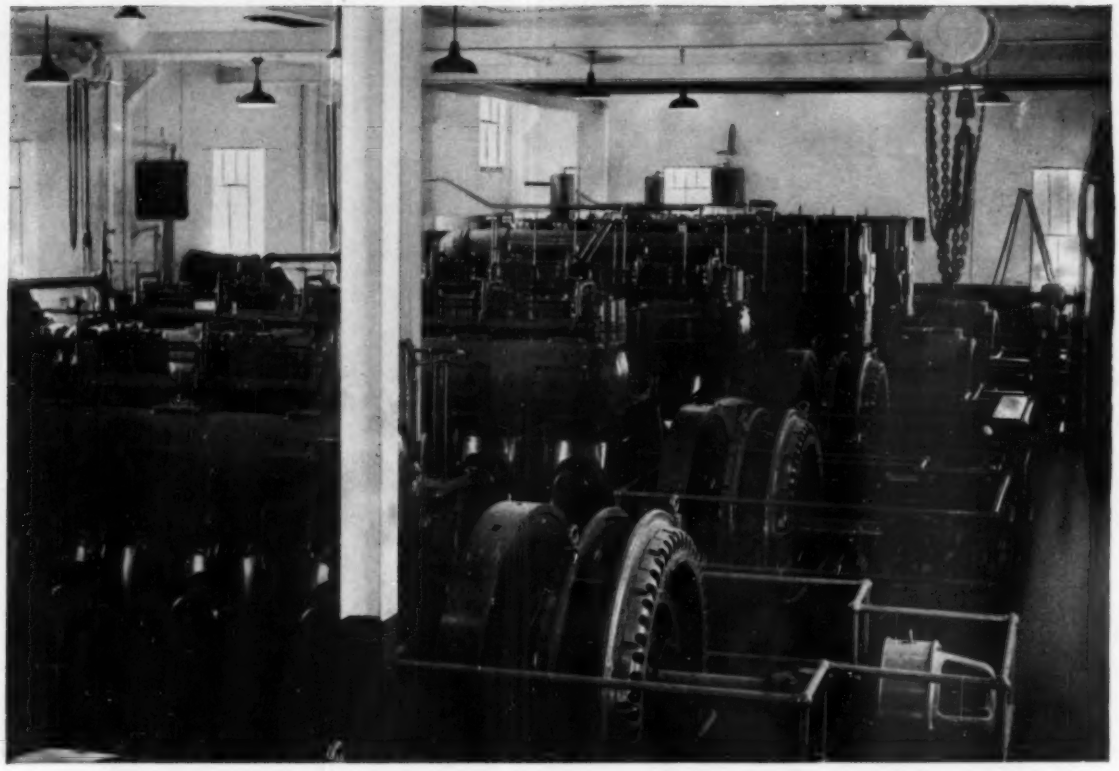

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Now, Let's Examine A Stewart & Stevenson Guarantee

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STANDARD ENGINEER'S REPORT

DATA

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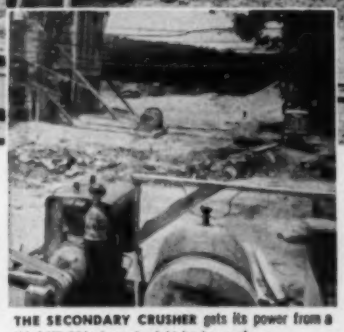
Bowling 'em over
AT BOWLING GREEN

POWER FOR GENERATOR is supplied by International UD-18A in left foreground, while its twin brother powers the primary crusher.



THE SECONDARY CRUSHER gets its power from a third UD-18A shown in right background.

Gary Brothers, Bowling Green, Kentucky, turn out 100 tons of crushed rock per hour, helped by three International UD-18A's

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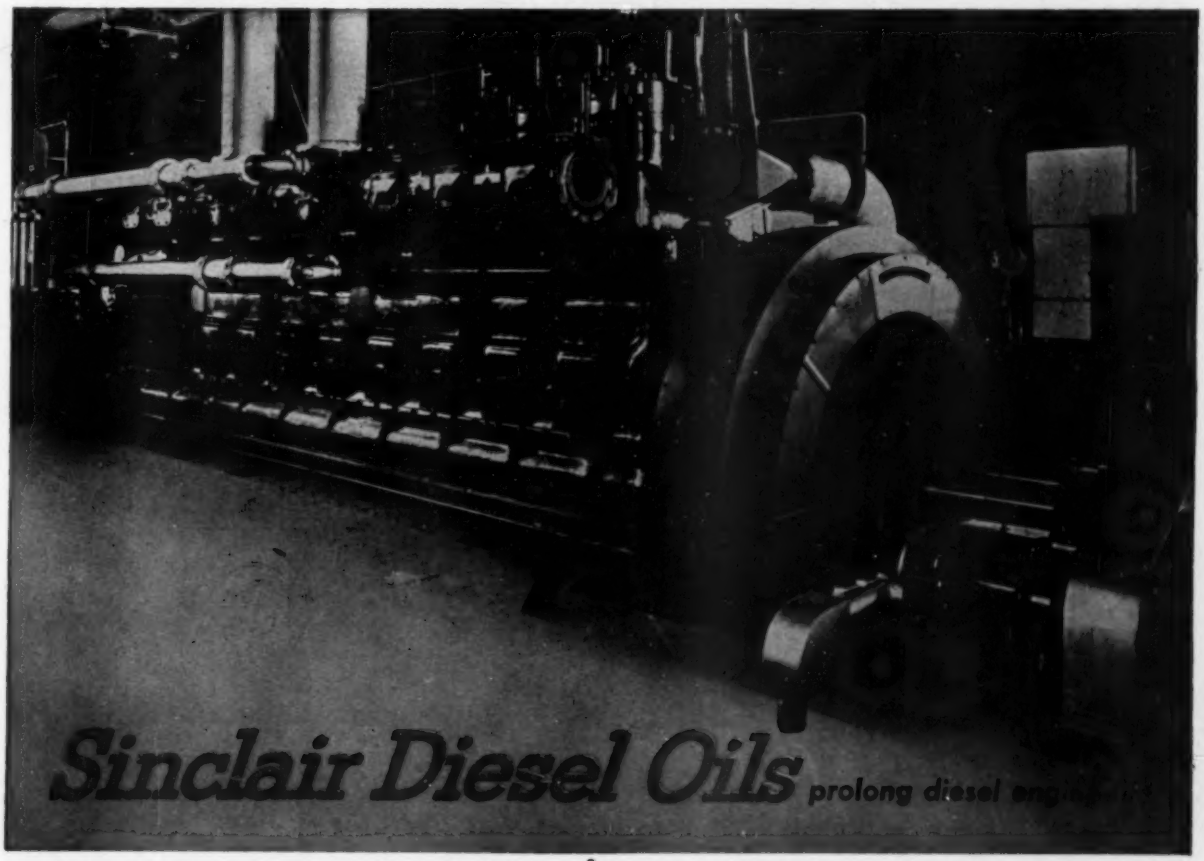

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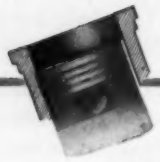

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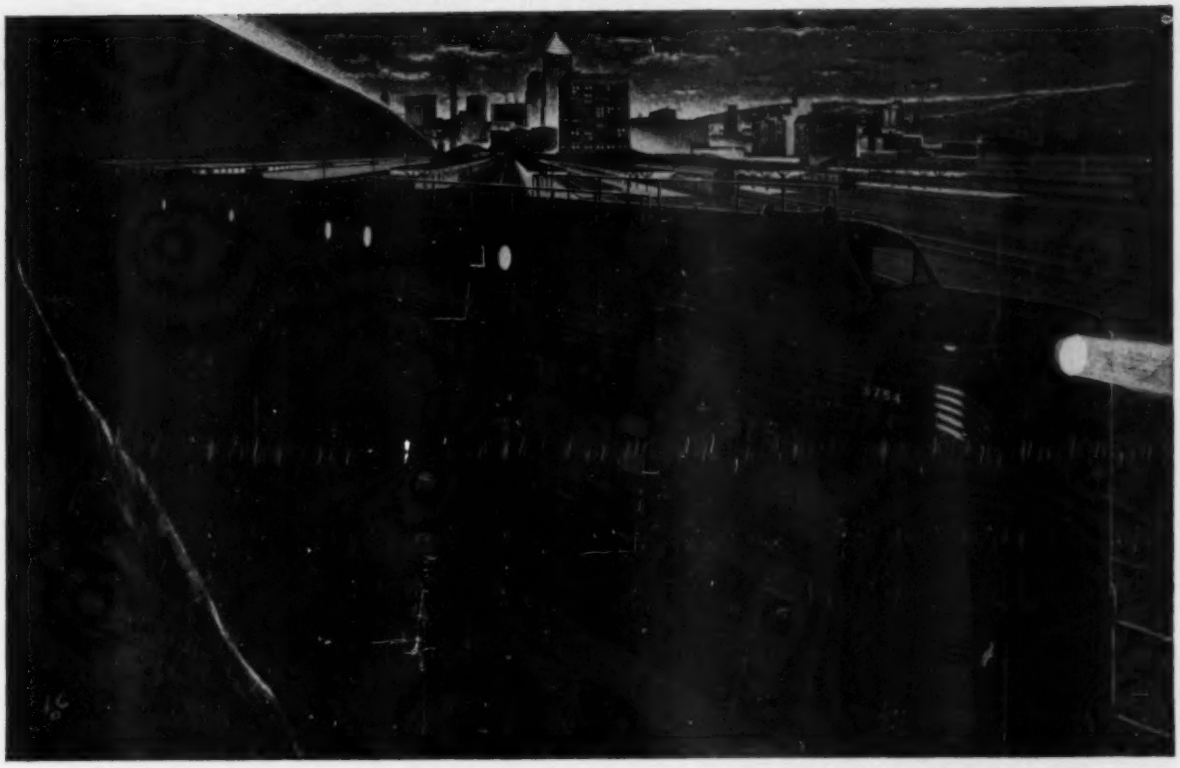
the trend is to Diesels — and to

GULF DIESELMOTIVE OIL



THE PITTSBURGHER, crack train of the Pennsylvania Railroad, leaving the Pennsylvania Station in Pittsburgh on its nightly run to New York City.

As recently as January 1949, there were only about 5,600 Diesel locomotives in service on U. S. railroads. Today the figure is over 10,000! And new Diesels are being placed in railway service just as quickly as the manufacturers can produce them.

More and more of these fast and powerful units get the right start for a long life and low maintenance costs with a crankcase fill of Gulf Dieselmotive Oil. Many of the Diesel locomotives for the crack trains of the Pennsylvania Railroad, for example, are lubricated with Gulf Dieselmotive. This outstanding oil keeps Diesel engines clean, prevents bearing corrosion, foaming, and excessive wear.

Gulf Dieselmotive Oil is one of a family of outstanding Diesel lubricating oils which includes Gulfpride-Diesel and Gulflube Motor Oil H.D. for automotive Diesel engines; Gulf Parvis Oil and Gulf Universal Oil for stationary and marine Diesel engines.

For further information on Gulf Diesel lubricating oils and for practical help on any Diesel lubrication or maintenance problem, call in a Gulf Lubrication Engineer. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

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New Caterpillar Diesel DW21 Tractor and No. 21 Scraper equipped with No. 27 cable control. Power-protected with Purolator Oil Filters.

The dirt that hurts . . .

THAT'S THE DIRT YOU CAN'T SEE! It's the dirt that engines suck in wherever—and whenever—they're running . . . the abrasive dirt that gets into the oil stream and ruins engines.

Unless you filter out this destructive load—you're in for expensive repairs, for costly lay-up time.

SOLUTION: the Purolator Micronic* Oil Filter. Purolator's element traps abrasives measured in microns (.000039 of an inch) . . . has a revolutionary accordion-pleated design which provides a filtering area as much as 10 times that of old-style oil filters . . . won't warp or disintegrate.

For fuel oil, this means the complete filtration needed because of close tolerances of injector tip orifices.

For lube oil, Purolator* assures less wear on hard-worked bearings and other vital parts.

Whatever your filtering problem, let our engineering staff show you how to solve it!

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"FIRST IN THE FIELD OF FILTERING"

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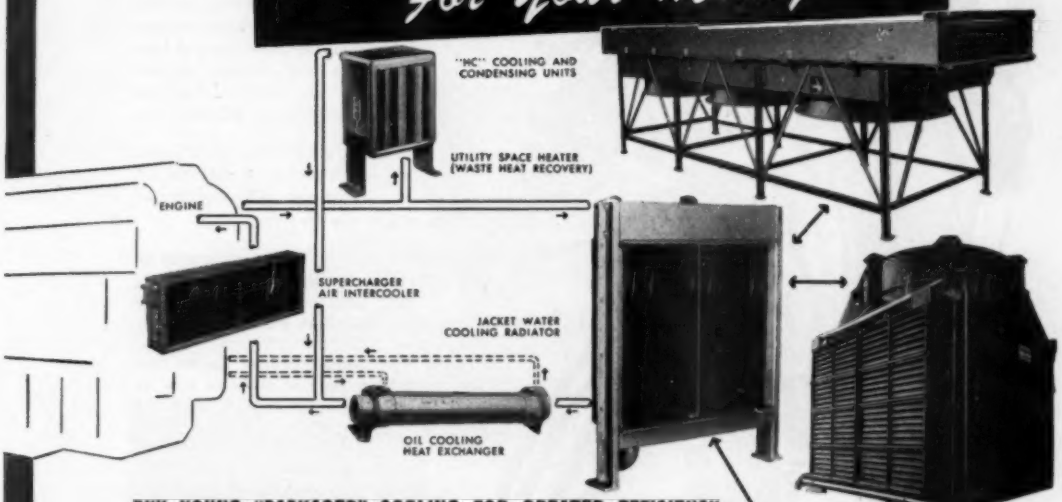

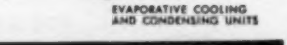

BUY YOUNG "PACKAGED" COOLING FOR GREATER EFFICIENCY AND OPERATING ECONOMY IN DIESEL ENGINE APPLICATIONS

If you use one or more of the heat transfer products illustrated above, you will find it pays to specify "Young" right down the line.

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It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast.*

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

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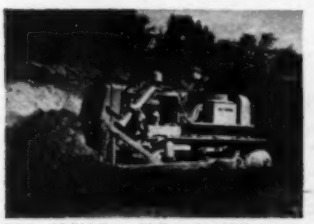
Editor—DIESEL PROGRESS

OUT AHEAD

with GM DIESEL POWER!

HD-20—41,800 lbs. of properly balanced weight; long, wide sure-gripping tracks and the new GM 6-110 Diesel engine driving through hydraulic torque converter give the Allis-Chalmers HD-20 brute strength to take toughest jobs in stride.

HD-15—27,500 lbs.—102 Drawbar H.P.—powered by a 6-cylinder GM Series 71 Diesel engine.



HD-9—18,500 lbs.—70 Drawbar H.P.—powered by a 4-cylinder GM Series 71 Diesel engine.

General Motors 2-cycle Diesel engines supply the hard-hitting power that enables Allis-Chalmers' great new line of tractors to outwork all others.

Four and six-cylinder GM Series 71 engines driving the HD-9 and HD-15—and the powerful new GM 6-110 engine driving the HD-20—give these new tractors a reserve of smooth, dependable power for easy handling, increased work and minimum maintenance.

The greater efficiency of 2-cycle operation and direct fuel injection simplifies design and enables these engines to produce far more horsepower than other Diesels of equal size and weight. Interchangeability of Series 71 engine parts provides maximum availability—keeps them on the job.

That's why GM Diesel engines are chosen to power not only the "World's most modern line of crawler tractors"—but more than 500 different kinds of machinery built by 120 manufacturers.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES ... Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS ... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

ANNOUNCING...

The NEW SHELL ROTELLA OIL

(Extra Heavy Duty Type)

"... exceeds every accepted performance standard for oils in its class"

OUTSTANDING PISTON CLEANLINESS

The new Shell Rotella Oil stands out in the very top bracket with respect to Piston Cleanliness, providing convincing proof of its ability to keep contaminants out of the critical zone in which wear is concentrated.

MUCH LOWER RING DEPOSITS

Ring-plugging tests are really tough, yet new Shell Rotella Oil came through stiff competition with a remarkably low ring deposit rating ... far below the established passing mark!

GREATER ENGINE LIFE

Recognized laboratory engine tests are important in establishing qualifications of lubricants to meet strict requirements. More important to operators, however, is the *tremendous increase in engine life* and the consequent reduction in maintenance expense and time out-of-service that the new Shell Rotella Oil is contributing to fleet operation under today's conditions.

NEW SHELL ROTELLA OIL...

Stepped up cleaning action...

Even greater anti-wear protection

. . . anticipating the needs of today's high performance fleet engines

TODAY'S hauling conditions are imposing greatly increased demands upon fleet engines . . . and the lubricants selected to keep them running. At the same time these high-performance engines are expected to turn in ever-increasing mileage records between overhauls.

For these reasons, and because even greater performance will probably be expected as time goes on, the detergent-dispersant and anti-wear qualities of Shell Rotella Oil have been markedly increased.

Operators using Shell Rotella Oil in the past will find an even greater latitude in maintenance procedures.

4-WAY LIFE EXTENSION FOR BUSY ENGINES

1. Remarkable detergent-dispersant action

The ability to suspend contaminants has been deliberately stepped up in the new oil. Field tests on vehicles, in widely varying kinds of service, prove conclusively that this greater detergent-dispersant action extends mileage between overhauls.

2. Drastic sludge reduction

Operators who have been having sludge troubles . . . with clogged pump screens, burned out bearings, or clogged oil ways . . . are urged to find out for themselves how remarkably clean those engines will remain while using this new anti-sludge Shell Rotella Oil.

3. Positive Anti-acid action

New Shell Rotella Oil directly counteracts the acid action of fuel combustion products in the vital top-cylinder zone . . . with correspondingly great reduction in wear. This protection is extremely important in the operation of intermittently loaded engines.

4. Extends time between engine overhauls

New or reconditioned engines . . . operating on fuels of widely-varying quality . . . in all kinds of fleet service . . . have demonstrated an important extension of in-service time. *This gain results from improvement in several basic respects: freedom from sludge and ring-clogging, increased valve life and greatly reduced wear.*

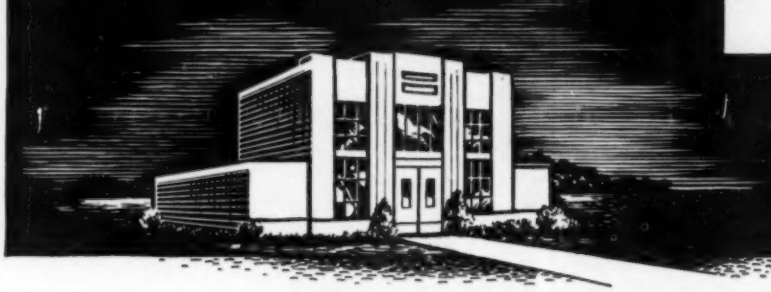
for all heavy duty fleet engines

SHELL

Facts

ABOUT FAIRBANKS MORSE DUAL FUEL ENGINES

- Over 160,000 hp. sold—128 engines—more than any other manufacturer.
- Savings reported over 50% in fuel cost.
- Field conversion parts available for many models.
- Basic Fairbanks-Morse design advantages—2 cycle, low rpm, low BMEP, fewer moving parts, proved record of performance.



A Sure Way to Get Lower Cost Kw-h!

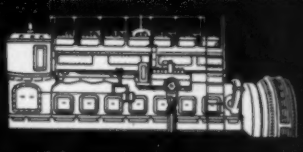
Wherever natural or sewage gas is available, diesel plant operators are producing lower cost kw-h by converting to dual fuel—or installing new dual-fuel engines. Leading the trend in this relatively new diesel development is Fairbanks-Morse, with field conversion parts for many popular sizes of Fairbanks-Morse diesels—and with a growing line of factory-built dual-fuel engines.* If you haven't thought of the savings dual fuel operation can bring to your plant—*you should. When you do, think of Fairbanks-Morse, for no other manufacturer has equal experience in building, installing and servicing dual-fuel engines!* The benefits of this experience are yours for the asking. Fairbanks, Morse & Co., Chicago 5, Illinois.

*Write for information, stating size and type of engine in which you are interested.

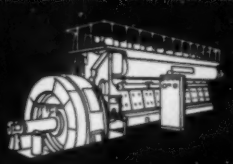
FAIRBANKS-MORSE,

a name worth remembering

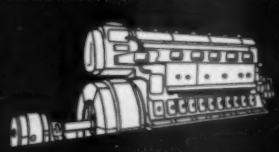
DIESEL AND DUAL-FUEL ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES • DIESEL LOCOMOTIVES • HOMEWATER SERVICE EQUIPMENT • FARM MACHINERY



Model 31: Up to 3500 hp.



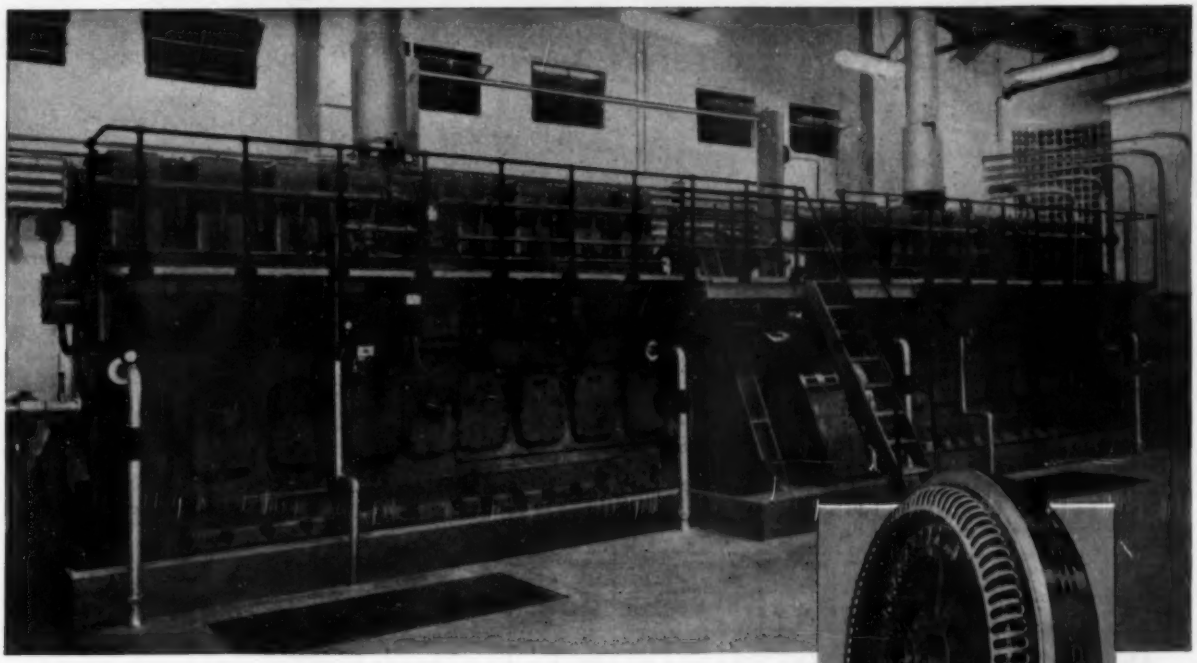
Model 33: Up to 2000 hp.

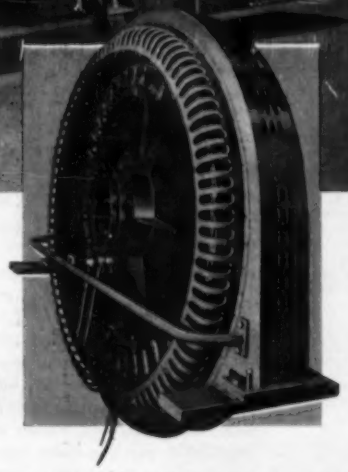


Model 38: Up to 2000 hp. (Opposed-Piston type)

YOU CAN BE **SURE**.. IF IT'S

Westinghouse





What you can't see...the PLUS added by Westinghouse Engineering

The only job of those big twin diesels, pictured above, is driving the Westinghouse A-C Generator almost lost in between them. An unusual installation—the first of its kind. Like many firsts, it too, presented problems. Insulating against the flow of shaft currents was one of them. Coupling the shaft looked like the answer—*if* an insulated coupling could stand up to the terrific driving force of the twins . . . *if* it lost no torque . . . *if* it could take it for at least a year without maintenance.

The engine builders asked Westinghouse, suppliers of the generator, to tackle the problem.

Westinghouse engineers designed an insulated coupling that did the job—and more, paving the way for future installations of this type.

This example shows the problem-solving ability offered by Westinghouse in building special generators for unusual applications.

Make certain you get the benefit of Westinghouse engineering on your next equipment. Power Apparatus Specialists—in principal cities—will help you select and apply the right equipment to the job. Consult them for any present or future plans. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21371

Westinghouse

DIESEL ENGINE DRIVEN AC GENERATORS

You have no power problem when a **Petter Diesel** drives your product!

Petter Diesels from 3 hp to 36 hp are ideal for Compressor Drives, Pumping Units, Road Rollers, Tractors, Stone Crushers, Concrete Mixers, Saw Benches, Refrigeration Machinery, Generator Sets for marine or industrial duty, and virtually every application where a dependable source of economical power is required.

ASSURED AVAILABILITY

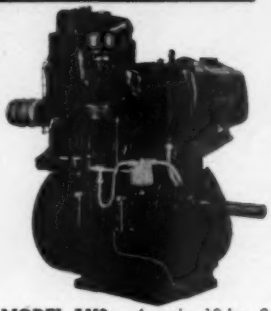
WORLD-PROVED DEPENDABILITY

ROCK-BOTTOM PRICES

PETTER *Water-Cooled* DIESELS

Petter water-cooled diesel engines are available in two basic 4-cycle models. Series AV–3 to 12 hp. Series B–12 to 36 hp. Thermo-syphon tank cooling or radiator. Hand or electric starting without difficulty, even under sub-zero conditions. Full-speed drive from either end or half-speed drive from timing-gear end except on B3 and B4 models. Aluminum alloy pistons and removable cast iron liners.

Type	HP Cont.	RPM	BORE In.	STROKE In.	LENGTH In.	WIDTH In.	HEIGHT In.	WEIGHT Lbs.
AV1	3/6	1000-1800	3.15	4.33	29.75	17.75	28.5	406
AV2	6/12	1000-1800	3.15	4.33	36.5	17.75	28.5	598
B2	12/18	1000-1500	4.33	4.33	43.5	21	37	939
B3	18/27	1000-1500	4.33	4.33	50.125	21	37	1218
B4	24/36	1000-1500	4.33	4.33	56.75	21	37	1478

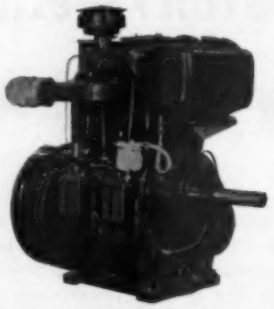


MODEL AV2 — 4-cycle, 12 hp, 2-cylinder, 1800 rpm, vertical, water-cooled industrial diesel engine.

PETTER *Air-Cooled* DIESELS

TYPE AVA–3 to 11 hp in 1 and 2-cylinder models. Air-cooled by flywheel fan and ducting over finned cylinders and cylinder heads. Light weight, low overall dimensions. Hand or electric starting. Full-speed drive from either end, or half-speed drive from timing-gear end. Totally enclosed, but easily accessible. Dependable operation under any climatic conditions. Direct injection with an open combustion chamber insures easy starting.

Type	HP Cont.	RPM	BORE In.	STROKE In.	LENGTH In.	WIDTH In.	HEIGHT In.	WEIGHT Lbs.
AVA1	3/5.5	1000-1800	3.15	4.33	29.75	20	29	390
AVA2	6/11	1000-1800	3.15	4.33	37.75	21	32	558



MODEL AVA2—4-cycle, 11 hp, 2-cylinder, 1800 rpm, vertical air-cooled industrial diesel engine.

Throughout the world, in over 100 countries, Petter Engines, parts and service are available. This is an added advantage for you if your equipment is to be sent outside the United States. The Petter factory, one of the most up-to-date and efficient plants in the world, produces 1500 Petter Diesels every week. Engines are strategically stocked throughout the United States and a continuous supply is assured to meet your needs. Write for all the facts as to why Petter will serve your needs better.

Dealers:
Only a few choice territories still open. Act fast for this valuable franchise.

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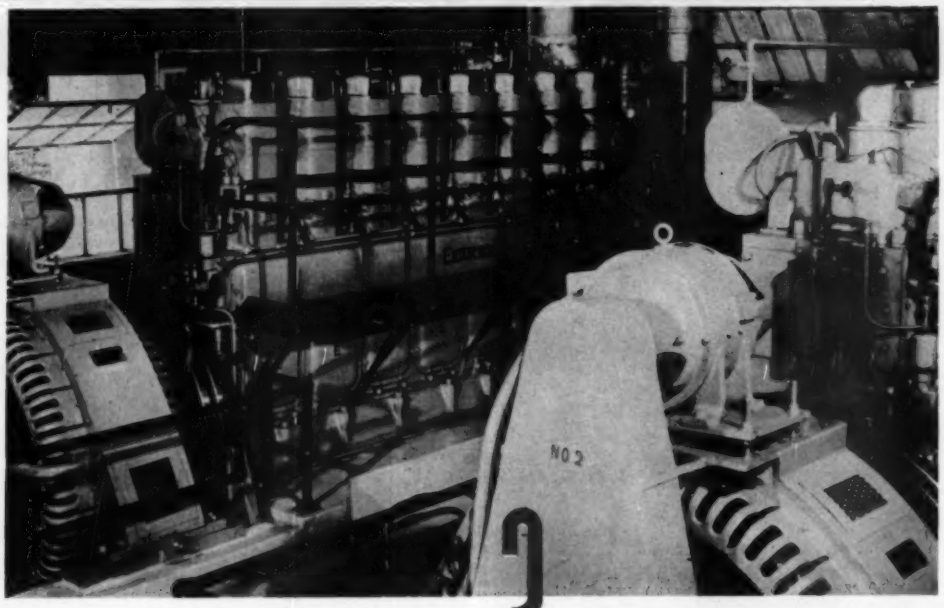


...Leads to Purchase of 3rd ENTERPRISE DIESEL

Positive proof of engine performance often lies in the profit picture. That's where the investment in new equipment pays off—or doesn't. At McLeansboro, Ill., where two of their three new Enterprise Diesels are now in operation, the proof is there: **the city's profit for the last fiscal year reached $33,526—including four months operating the old turbine generator system at a loss!* And with the installation of a third Enterprise Diesel, purchased as a result of the high operating performance of the first two, city officials predict the annual profit will jump to more than $38,000. The city of McLeansboro is now assured of 1) a reduction in electric rates, 2) sufficient and dependable power to take care of future growth and development, and 3) a modern power plant that is quickly paying for itself.

The story at McLeansboro is not uncommon where Enterprise Diesels have been put to work. Scores of these efficient units, serving the needs of progressive cities everywhere, daily demonstrate the fact that both power-wise and profit-wise, Enterprise is first in the field. *Enterprise Engine & Machinery Co. A Subsidiary of General Metals Corporation, 18th & Florida Sts., San Francisco 10, Calif.*

The Choice of Power Experts E

Enterprise
STATIONARY
Diesels

NEWTON, ILLINOIS

By: Douglas Shearing

SOME of the older residents of Newton, Illinois still remember the excitement which prevailed with the first night that the electric street lights were turned on. This was in 1894 and one of the outstanding events in the history of the city which celebrated its centennial in 1935. These were carbon arc lights, the type of electric street lighting used in that early day. Power was supplied from the municipally owned plant which had been built with a bond issue, the generating equipment consisting of a small steam engine belted to an Edison bi-polar direct current generator. Steam was furnished by a single boiler. There was no stand-by service in those days.

The service supplied was not in keeping with present day standards. The plant only operated during periods when there was no moonlight and only from darkness to midnight. Later the operating schedule was changed to light the streets every night regardless of the moon, and later still, extended to cover the entire night from darkness to dawn. This service continued until 1898 when a demand arose for domestic and commercial lighting. In that year a 133 volt alternating current generator was added, this too, was belt driven from the existing engine. In the years which followed many changes were made in generating equipment and the system changed to three phase, 60 cycle. The engines in service when the present building was constructed in 1918 were later replaced with units that were operating when steam was abandoned in February, 1950. This equipment consisted of 625 kva. turbine and two 20 in. x 24 in. poppet valve uniflow engines direct connected to 250 and 312 kva. generators, all operating condensing. The turbine had seen previous service before it was installed in 1948. The engines had been in service since 1927 and 1934.

It was not unusual that steam was favored in the early years of the plant's operation. Steam engines were dependable and were generally used at that time for operations requiring units of this size. Newton was favorably situated in regard to coal supply, being close to both Illinois and Indiana fields. The price of coal was such that the plant could be operated on a profitable basis. After more than fifty years of operation, conditions arose making it imperative that something be done to provide more economical performance if the plant was to continue in service. The price of coal had steadily increased. The generating units and the boiler had become obsolete and the maintenance exorbitant. Rates had been reduced in 1938 and again in 1940 but in 1948 rates were raised in an endeavor to put the plant on a profitable basis. In that year consideration was given as to what action should be taken to make the plant an asset rather than a liability to the city. Like many municipalities, Newton considered the more efficient diesel to replace the old steam equipment and in 1949 placed an order for three supercharged Nordberg diesels. The last year the steam plant was in service it operated with a loss of about $4,000.00. The fuel bill alone for the last month of steam operation amounted to $4,800.00. An unusually high figure resulting from paying a premium price for coal due to a prolonged strike.

The first diesel was shipped in December, 1949 and was on the line in January, just five months after the order was placed. But before the engine could be placed in service, the steam equipment failed. At 2:40 p. m. on the last Monday of December the high pressure boiler developed a leak and the city was without service, except for a small amount of power that could be generated to keep the water system in operation. Emergency repairs were made and power was again restored at 9 a. m. on the next day. It became apparent, however, that the repairs that had been made could not be depended on to assure service and the Central Illinois Public Service Company was appealed to for an emergency connection. This utility went into action immediately moved in a portable sub-station and at 5 p. m. on Tuesday began to send in electricity over the city's transmission lines. While the amount that could be delivered was limited because of the carrying capacity of the line leading in from the outskirts of the city, stand-by service was provided and the danger of a complete interruption averted until the first diesel could take over the entire city load. The time required to change from steam to diesel was facilitated since no addition to the building was needed to house the diesel equipment, switchboard and auxiliaries. Sufficient space was provided by the removal of several abondoned boilers and a smoke stack. Looking at the new engine room, one can scarcely believe it was ever a part of the dark dusty boiler room.

The three 800 hp. Nordberg diesels have six cylinders of 13-inch bore and 16½-inch stroke and are of the 4-cycle supercharged design. The engines are direct connected to 560 kw 3 phase, 60 cycle, 2400 volt generators with Vee belt driven exciters. Fuel is delivered to the plant by truck from a refinery in Robinson, a haul of 23 miles and stored in two 210 barrel, vertical, above ground tanks. The fuel oil transfer pump for transferring fuel from truck to storage is also used for transferring fuel from storage to the engine day tanks. This is a rotary pump of 35 gpm. capacity and driven by a 3 hp. motor. Fuel to the three day tanks is metered by 1¼-inch meters. Dual filters located just ahead of the built-in engine transfer pumps, filters the fuel before delivery to the injection pumps. Since the steam engines operated condensing, it was possible to utilize the existing tower for the closed cooling water system. There are two raw water pumps so arranged that either pump can serve any engine. These are pumps of 300 gpm. capacity at 100 foot head, driven by 10 hp. motors which take suction from the base of the tower and discharge through the lube oil coolers, then through

the jacket water head exchangers and back through the spray nozzles in the top of the tower. Jacket water is circulated by three pumps of 200 gpm. capacity at 65 foot head driven by 7½ hp. motors discharging through three heat exchangers. These each have a capacity suitable for cooling 200 gpm. of jacket water from 160 to 145°F with 150 gpm. of raw water from 113.7 to 133.9°F. Three 3½-inch automatic temperature regulators maintain a jacket water temperature at 155°F. A water softener is used for jacket water softening.

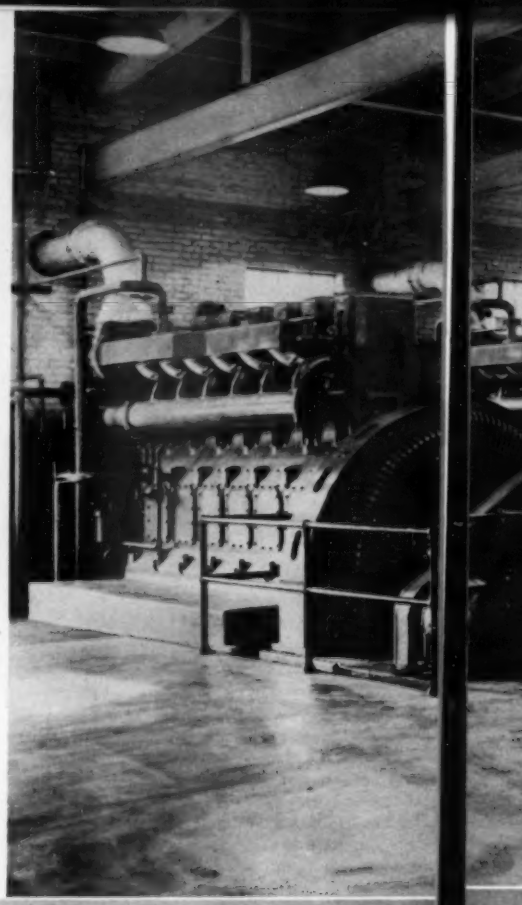
Lube oil for each engine is circulated by built-in pumps which take their suction from the sump tanks and discharge through three exchangers which have a capacity of 89 gpm. of lube oil from 160-145°F, with 150 gpm. of raw water from 110 to 113.7°F. From the heat exchanger, the lube oil passes through a strainer located at the end of the engine and then to the lube oil header for re-circulation. Each engine has an oil purifier with 3 kw. heater element, which by-passes some of the oil and returns the cleaned oil to the system. Each engine also has a hand operated before and after pump for lube oil. Controls for the auxiliaries and the visual and audible alarms for temperatures and pressures are located on the wall adjacent to the heat exchangers. Air is filtered by three automatic self cleaning oil bath cleaners and silenced by silencers mounted at the engines. Starting air is provided by a 19.8 cfm. displacement, 250 psi. two-stage, air cooled compressor driven either by a 5 hp. motor or a 6 hp. gasoline engine.

A new seven panel switchboard was installed for the diesel engines. Three of the panels are for the three generators, three feeder panels and one panel for totalizing watthour meter. There is also a swing panel for synchroscope, frequency and power factor meters and two ac. voltmeters. This board was furnished by the generator manufacturer. The old switchboard has been retained and still used for the street lighting circuits.

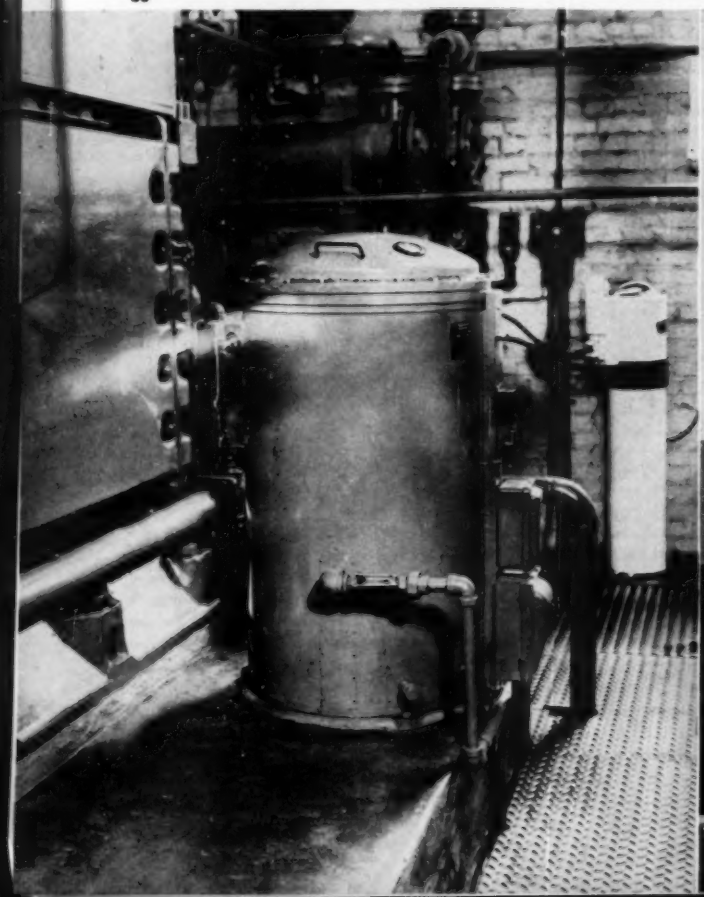
A comparison of generating costs of steam and diesel operation shows a decided advantage in favor of diesel. While no complete records are available on the steam plant, the cost per kwh. during the last few years not including the period of high coal cost during the strike, averaged around 3½ cents. Although the diesel plant has not operated long enough to stabilize generating costs, the cost per kwh. for the months of April and May show a production cost of one cent. This includes fuel and lube oils labor and maintenance. In this two-month period, 395,970 kwh. were generated with 29,720 gallons of fuel, or 13.32 kwh. per gallon. The average load was 270 kw. or 45% of rated capacity of one engine normally in service.

Considering a loss of $4,000.00 for the last year of steam operation, diesels, in addition to putting Newton's electric utility on a profitable basis, assure dependability of service with ample capacity to meet the city's needs for some years to come.

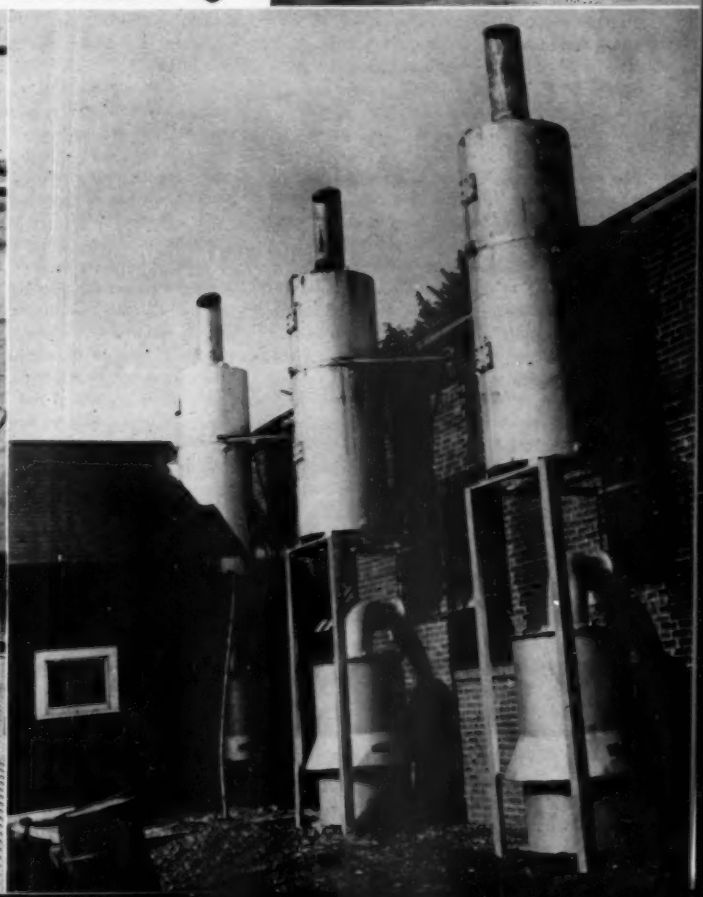
While the diesel engines have not been in service long enough to determine the performance of the



Air is filtered by these three American Automatic self cleaning Cycoil oil bath cleaners. Above are the three Maxim exhaust mufflers.



Honan Crane lube oil purifier with 3 kw heater elements are installed for each Nordberg diesel. At wall is shown Permutit water softener, also controls for one of the auxiliary pumps.

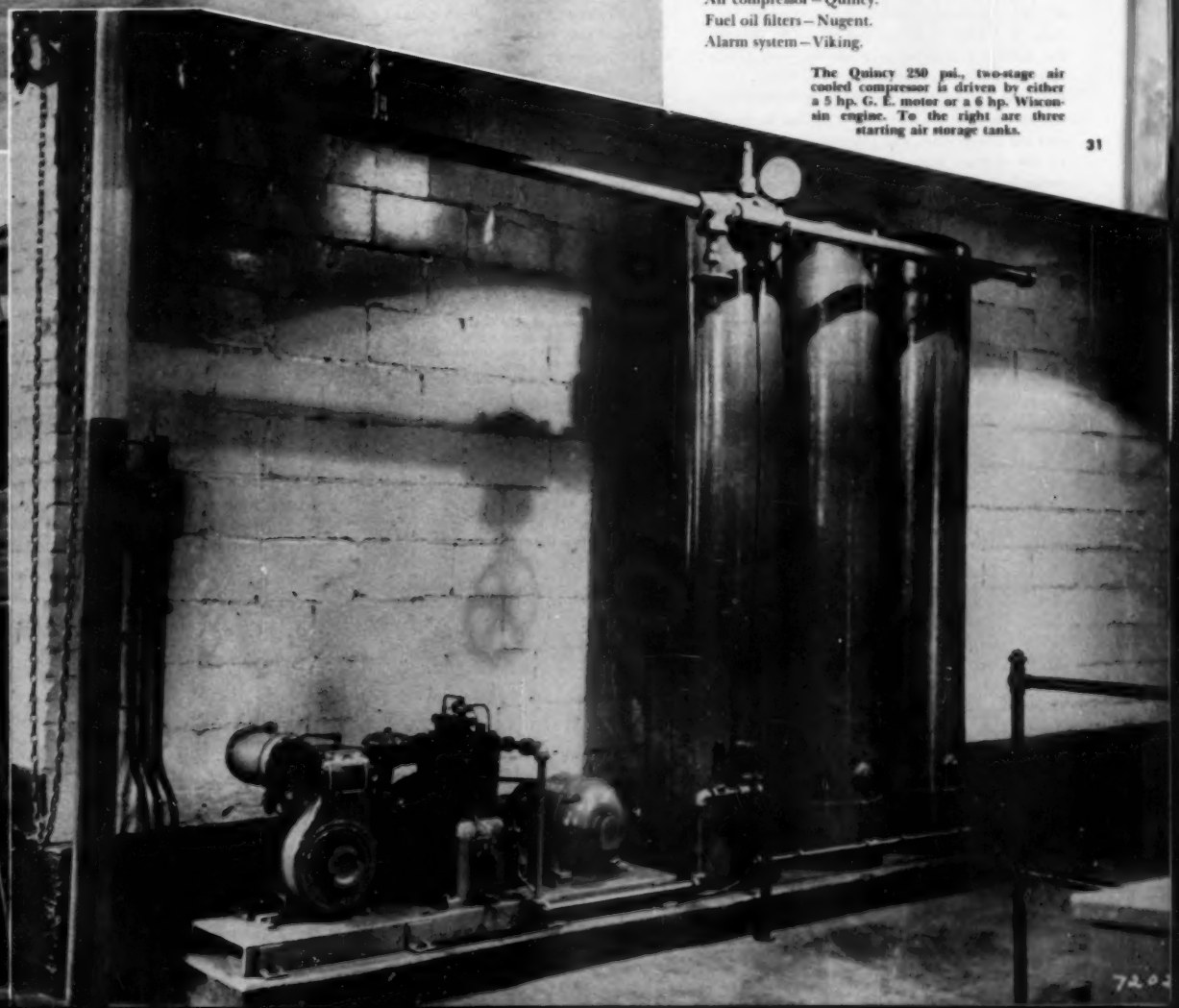


plant from the standpoint of profits, figures taken from a report submitted by S. J. Sibley Associates, Consulting Engineers, who engineered this entire installation, show the following estimated profits for the first five years:

1950 – $57,300.00
1951 – $67,000.00
1952 – $76,900.00
1953 – $77,200.00
1954 – $79,900.00

List of Equipment

Main engines – Nordberg Manufacturing Co.
Generators – Electric Machinery Mfg. Co.
Exciters – Electric Machinery Mfg. Co.
Switchboard – Electric Machinery Mfg. Co.
Oil filters – Honan Crane.
Lube oil coolers – Ross.
Fuel oil transfer pump – Roper.
Fuel oil meter – Niagara.
Lube oil strainer – Purolator.
Raw water pumps – Worthington.
Fresh water pumps – Worthington.
Water softener – Permutit.
Heat Exchangers – Ross.
Cooling Water pumps – Worthington.
Water temperature regulators – Fulton Sylphon.
Intake air filters – American.
Exhaust silencers – Burgess-Manning.
Air compressor – Quincy.
Fuel oil filters – Nugent.
Alarm system – Viking.



The Quincy 250 psi., two-stage air cooled compressor is driven by either a 5 hp. G. E. motor or a 6 hp. Wisconsin engine. To the right are three starting air storage tanks.

DIESELS DIG DEEP TROUGH

Four Contractors Join Forces to Move 5,000,000 Yards of Earth for Big Pump Inlet to Tracy Plant That Will Lift Water from Sacramento Valley to San Joaquin, Where It Is So Badly Needed

By F. HAL HIGGINS

WATER has become the most valuable product of nature in the west. It is the limiting factor on increasing population and prosperity. Hence, where it is found in excess quantities the public is demanding and okaying political and engineering projects to redistribute the precious stuff that has become the lifeblood of agriculture, industry, and population growth. So, the taking of Sacramento Valley water to supplement the falling and inadequate water supplies of the San Joaquin Valley is one of the most interesting of modern engineering achievements. It not only marks an engineering feat in which both ends of a state endorsed but probably forecasts the future of more stupendous engineering jobs such as the bringing of Columbia River water from the Oregon-Washington boundary to Central and Southern California. The idea is already past the rumor stage and plans are being studied by the United States Government. Such water redistribution might conceivably double the populations of California and Arizona; maybe Nevada later. The writer took several looks at the Central Valley Project canals the past three years in camera visits to different sections from Bakersfield to Tracy and beyond to the big pump inlet. The site of this giant electric pump he visited several times because of the amount of dieselized pieces of equipment in the hands of four prominent contractors who had the job of moving 5,000,000 yards of earth for the inlet to this pump. Recalling the revolution in dirt moving started by a Cleveland, Ohio, firm of manufacturers when they put big air tires on their equipment to increase length of haul and cut time of round trip from shovel or dragline to fill, he paid special attention to the Euclid equipment seen here teamed up with fleets of crawler diesel tractors with bulldozers, diesel motor graders, etc. Here in the Euclid loader was a later step in the development of the dirt moving line to meet the ever-pressing demands of contractors for cost cutting in moving a yard of dirt. The writer recently dropped in to talk to the western branch of Euclid Road Machinery Co. in Oakland and asked questions about present trend, past accomplishments and this Tracy inlet job.

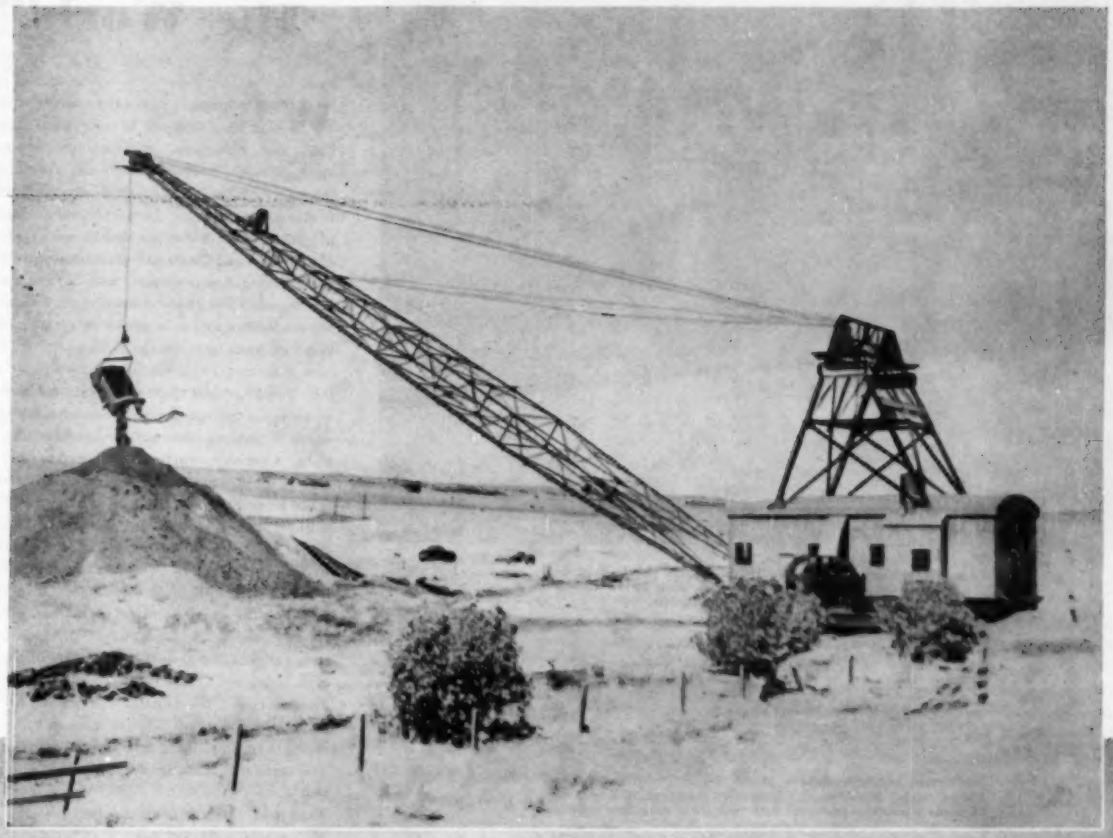
"On that job of Stolte's in which that firm with three other associated contractors moved 5,000,000 yards of dirt," said the Euclid branch man, "there were eight bottom-drop Euclids and one Euclid loader. All were dieselized with Cummins engines of 150 hp.—the HB model. The contract covered a stretch of terrain from river to pump site, going under a railroad. George Watters was project manager for Stolte. Naturally, our location here made service an easy matter for the contractor. Service is all important. Now that war is over and competition is on a more normal level, the manufacturer who can and does render service to back up his equipment is in a position to stay in business and go ahead when the going gets tough and poorer serviced equipment begins to be dropped out."

The contractors on this job near Tracy expressed satisfaction with their equipment, taking it more or less as a mater of fact that diesel equipment stands up these days. They know their equipment and agree that it has all gone diesel since the war's end as far as practical where a lot of it was not yet dieselized for lack of engines during war. Let's have a look at the government specifications on this Tracy Pumping Plant to get an idea of the caliber of it in engineering language: *Location*—Northeast corner of Alameda County about nine miles northwest of Tracy (San Joaquin County), California between Highway 50 and State Highway 33. *Water Source*—Shasta Reservoir American Feather River and Sacramento River in Northern California. *Purpose*—The Tracy Pumping Plant is called the "heartbeat" of the Central Valley Project because it provides the means by which water from the Delta Cross Channel is lifted into the Delta-Mendota Canal—197 feet higher in elevation. This pumping lift, made possible with power developed at Shasta Dam, is the key in accomplishing the transfer of water, conserved and released by Shasta Dam, into the water-deficient San Joaquin Valley, which is the basic purpose of the Central Valley Project. *Description*—The Tracy Pumping Plant consists of three main components—the Inlet Canal, the Pump Building and its equipment, and the discharge lines.

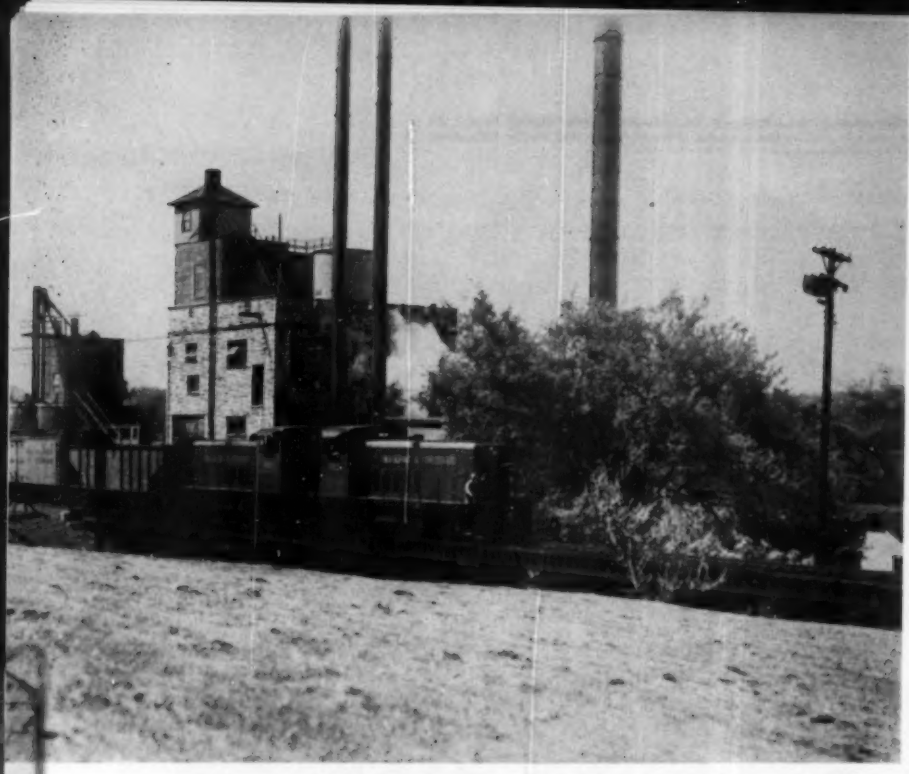
Pair of diesel-powered Lima draglines excavating for the Inlet to the Giant Pumping Plant in the Central Valley project. Three Cat diesel DW10's are lined up to catch the dirt as emptied from the Limas. Stolte Co., United Concrete Pipe Co., Duncansen and Harroldsen, and Ralph Bell were on this job of moving 5,000,000 yards of dirt between the river and the big pump located 9 miles northwest of Tracy, Calif.

Cummins diesel-powered Euclid leaving loader with heaped wagon such as has revolutionized dirt moving and cut costs on dam construction, road building, airport building, etc., 15 years ago. It was a gas-powered job at start, but went diesel as soon as such power became available.

Morrison-Knudsen's 800-hp. Cooper-Bessemer diesel-powered dragline digging through the low hills of the San Joaquin west side just south of the big pump that lifts the Sacramento water into the San Joaquin Valley via Delta-Mendota Canal.



The "Whiskey Railroad Of The World"



Fast, efficient switching service for industrial plants that dot F & C's right-of-way is accomplished with these 70-ton Cooper-Bessemer-powered diesel locomotives.

Joe Norris, Superintendent of Motive Power (left), and George Fowler (right) Frankfort & Cincinnati's president, talk over one of many operating problems that face their short-line railroad these days.

WHEN it comes to erasing red ink from the operating ledgers of short-line railroads, you'll have an impossible job on your hands convincing George L. Fowler that today's 70-ton diesel locomotive is not the greatest salvation ever to rescue the small rail carrier from its financial plight. In view of the fact that recent experiences at Frankfort and Cincinnati Railroad typify so well the plight of America's small rail carriers, progressive management of these lines might well stop to learn how F. & C.'s able president, George Fowler, saved his road from financial ruin.

The Frankfort and Cincinnati Railroad Company operates as an independent common carrier between Frankfort, the capital of Kentucky, and Paris, Kentucky, where it connects to the main line of the Louisville and Nashville Railroad. Because its principal function is to service the many world-known distilleries of Scott and Franklin Counties dotting its 40 miles of track, railroad tradition has named Frankfort and Cincinnati "the whiskey railroad of the world." In addition, it carries the major tonnage of lumber, minerals, cattle, tobacco and agricultural products to the state's capital, Frankfort, in the heart of the blue-grass country. Like other short-line railroads, Frankfort and Cincinnati's operations are more on the "unglamorous" side of modern railroading, compared with railroading's counterpart—the main-line roads with their streamlined diesel equipment and long cross-country runs. Yet without these small and little publicized operators, the main-lines would today be faced with an unsurmountable ask in gathering and distributing the millions of tons of freight that pass across this country's right-of-ways.

Acting as "feeders," today's small-line roads must of necessity be exceedingly flexible in their operations. As switchers, they are expected to deliver freight cars to industrial sidings with every dispatch of the main-line operator. They daily make up several trains and haul the day's industrial shipments over varying distances to meet main-line schedules. They must maintain substantial stand-by reserve facilities to handle, often without notice, unknown increases in freight volume. In spite of maintaining the same type of facilities as main-line roads, the small carrier must carry on these services without over-burdening the revenue gained from normal operating resources. Often considered "stepchildren" to the main lines, it is perhaps ironical that many main-lines at one time or another owned most of the short lines. Unable to operate them profitably, the large carriers had to abandon the short lines, selling to independent operators. Through ingenuity and close personal management, these independent operators are now running the short lines with amazing success. As was true of other small rail carriers at the close

of World War II, F. & C.'s George Fowler watched his company's revenue drop drastically from the loss of industry's war-time tonnage. Then came the heavy bite of peace-time business being lured away by highway trucking carriers. Not that this dilemma alone was critical in itself, F. & C., like other roads, was continually confronted with the tide of rising costs in labor, equipment and fuel. It was in such unhappy surroundings in 1947 when F. & C.'s president, George Fowler, undertook his program to completely dieselize F. & C.'s motive power. Since then, operating results have been constantly supporting the wisdom of the decision. Cost-wise George Fowler makes no secret of his accomplishment. He's only too glad to show you how his three Cooper-Bessemer-powered 70-ton G.E. diesels are saving Frankfort and Cincinnati's treasury over $27,000 each year. As George Fowler ably puts it, "if it hadn't been for the money saved in operating expenses made possible by the 70-ton diesels, our road just couldn't operate." Then with his superintendent of motive power, Joe Norris, and general traffic manager, Ed Kennedy, who keep close personal watch on the pulse-beats of the road, George shows you how teamwork does it down south.

Excluding the costs of maintaining a right-of-way, the direct expenses of operating locomotives bear directly on the profit or loss entries in the small railroad's ledger. On short run roads, the maintenance of steam locomotives in most cases has traditionally been an overburden on direct operating expenses. By their very design, steam locomotives, of necessity, require the maintenance of the traditional but costly roundhouse where usually one out of every three locomotives must be stalled, its fire box blown and running repairs made. Constant watch on locomotive fires and steam pressures generally requires one or more "hostlers," skilled men who must be kept on the job around the clock. At Frankfort and Cincinnati, for example, such maintenance expenses were eating away over $25,000 a year from operating revenue. After replacing the seven steam locomotives with 70-ton diesels, F. & C.'s cost returns show that such expenses have now dropped to little more than $9,000, recovering from the "loss" column well over $14,000 a year. These figures are based on four and one-half million ton miles hauled each year. Operation-wise, Joe Norris, F. & C.'s burly superintendent of motive power, will go on to show you how the 70-tonners are speding up his road's service to the industrial plants. In yard switching, his men are daily shuttling more cars because of better visibility and faster control. On negotiating sharp curves, so common on industrial sidings, F. & C.'s diesels are going right in after the cars, in sharp contrast to the old steamers that had to utilize other cars as "pushers." Diesels have not only simplified operations, but cut drastically the hazards to train crews.

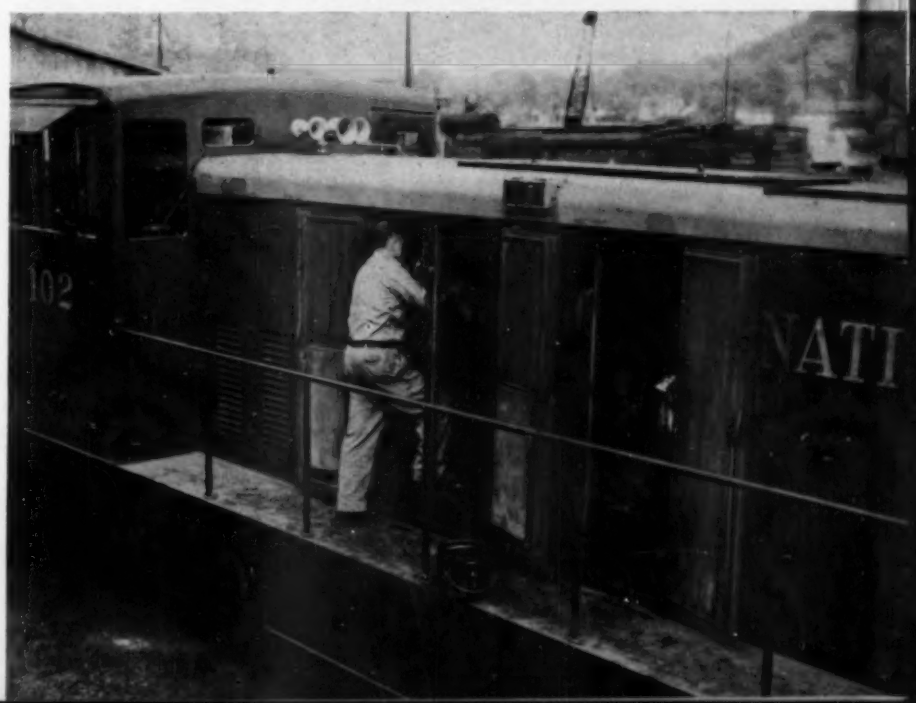
By its own nature, today's 70-ton G.E. diesel locomotive is proving the logical motive power for the small carrier. Through the use of supercharging on its diesels, the 70-tonner develops over 650 hp. with draw bar pull exceeding that of the old steamers it has replaced. Important to railroads is the fact that the diesel's full power is available at starting speeds whereas the old steam locomotive could develop its greatest power only at higher speeds. To the modern railroader these facts mean that today's diesel pulls anything it can start with the added advantage of a high draw bar pull to pick up heavy loads. Because of its relatively low weight-to-power, the 70-ton diesel can be readily adapted on small roads whose right-of-ways are generally built from 60 or 70 pound rail. Attempts have been made to use heavier locomotives on these short lines. However, the tendency to spread rails and overload trestles has made the heavier diesel impractical, as rebuilding rails and bridges is, of course, costly and in most instances beyond the financial reach of most operators. An added value of the 70-tonner is that it can be used as a single unit for switching, and then multiple operated with a second engine for longer hauls, thus strengthening the versatility of its service especially where longer, steeper grades are encountered.

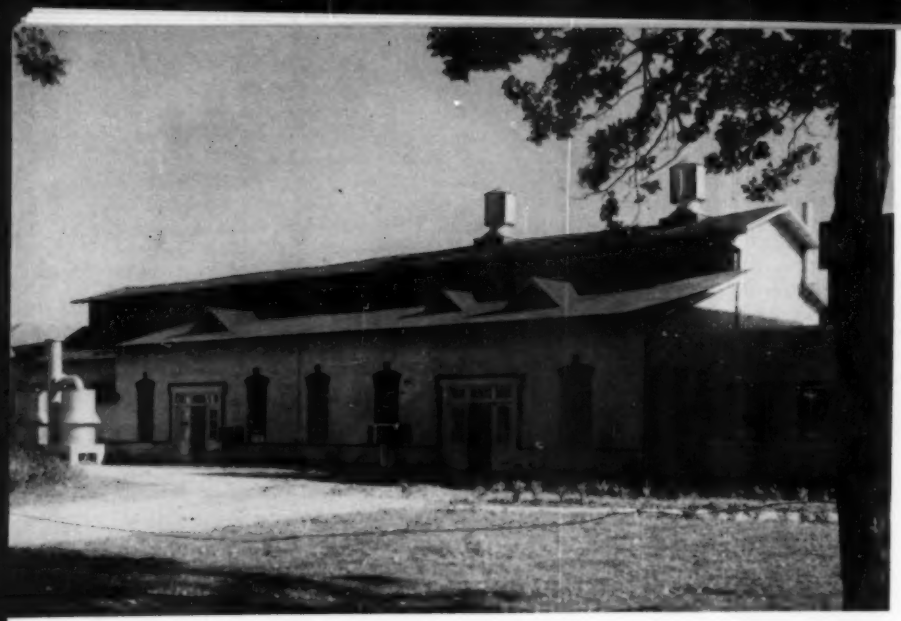
If you check still further with F. & C.'s president, you'll find more dollars-and-cents figures that are now adding black ink to the road's books. Back in 1947, when the steam locomotives were carrying the tonnage, fuel costs were averaging 26 cents per-ton-mile with coal figured at only $4.63 a ton. On the same yearly ton-mile basis, fuel costs today are averaging only 12 cents a ton-mile with fuel oil priced at 10½ cents a gallon. For Frankfort and Cincinnati, the resulting net saving of 15½ cents a ton-mile is recovering a yearly amount of $27,641, a reduction of 68 per cent in operating costs. It's little wonder then why George Fowler's face lights up when he mentions the total yearly saving of over $41,000 in maintenance and fuel that his road is now realizing because of the decision three years ago to replace F. & C.'s steamers with 70-ton diesels.

If you're a dyed-in-the-wool railroad man, you'll want to step out into F. & C. yards where Joe Norris is going over the day's operations. Probably he'll first apologize for the fact that his pride and joy 70-tonners are a little dirty. Then he'll take you to one end of the yard where old No. 11, the last of the steamers, is waiting for someone to take it off his hands. He'll tell you about how the old steamers had to be coalled at each end of the 40-mile run between Frankfort and Paris, turned around after each trip and each night rolled into the round house for a going over. "Maybe modern railroading isn't as romantic as in the days of the old puffers," comments Joe Norris, "but it's sure more practical." He's referring to No. 100, one of the three diesel switching cars in the yard. "Now we fuel them up once every three days and forget 'em. When you want them, you simply start the diesels and in twenty minutes you're ready for business. No more waiting an hour to get up steam as in the old days. You can figure on them being available 98 per cent of the time. You know," Joe Norris goes on, "with three diesels we're handling the same tonnage that used to take seven steamers."

While you stand in the yard with Joe Norris and watch the noon day's freight train pull out, you get the best over-all picture of the short lines important but day-to-day existence. As F. & C.'s Cooper-Bessemer diesels beat the start of the 960-ton haul up the 2½ per cent grade that leaves town, you see and better grasp the meaning of this unheralded but vital link in America's industrial life. Then as the train reaches Buffalo Trace, at an 800-foot viaduct spanning a 150-foot gorge once cut by the buffalo herds hundreds of years ago, you can't help but wonder what would happen if these little arteries were to be cut or die from neglect. Then for a brief moment, you have a true perspective of the importance of today's 70-ton diesels and of railroaders like George Fowler who so brilliantly are managing the short-line roads.

Simple maintenance and adjustment of engines on 70-ton diesel locomotive eliminates need for keeping up the costly roundhouse so essential to steam locomotives.





GARNETT REVISITED

Kansas Diesel Plant in High Cost Era Continues to Make Money by the Hatful: Adds 1,400 hp. F-M Unit as Load Rises.

By HENRY J. BARBOUR

IT is our pleasure (and our business) to go visiting around the country and see how people run their power plants, to see how prime movers really behave out in the field under ordinary operating conditions. We get a kick out of seeing engines make a liar out of the rules of thumb — like the one that says a diesel is a dead duck after twenty years and should be written off on the books. Since the war, we've heard a lot about rising costs and there's no denying that fuel oil has earned the name "black gold" and that operating engineers need more pay if they want to stay friendly with the butcher and grocer. Well, the calamity howlers took one quick look at operating costs and started writing obituaries about the diesel plant. Of course the death notice was premature. There's a lot of bounce in the American economy and a lot of ingenuity in the American engineer. The engine builders perfected the dual-fuel engine to tap a cheap source of btu's in natural gas and hundreds of millions of dollars of private capital pushed gas pipelines thousands of miles across the country. Other developments cut the costs and increased the efficiency of the new diesels.

But how were the modest-sized old plants faring—plants like the Garnett, Kansas, municipal power plant with veteran diesels 25, 20 and 13 years old? We had been to Garnett back in '41 in the low-cost days when profit came easy. But by all accounts those postwar years should have been hard on the bank account. First thing we noted as we approached the plant was a new, ultra-modern, two-story water purification plant tacked on to the power station. That didn't look like municipal poverty. The power plant had been extended too and inside the door we could see a big new engine. Superintendent John Watkins was still on hand he quickly got down to work bringing us up to date on developments at Garnett.

The new engine, which had gone into service in mid-year 1948, was a 1,400 hp. Model 33F Fairbanks-Morse diesel. This 7-cylinder unit has a bore of 16 inch, stroke of 20 inch and develops its rated hp. at 300 rpm. The other three units, which I had seen on my previous visit, were all still in operation although the accountants had already written two of them off the books. The 1,000 hp. Nordberg, installed in 1937 was, of course, still a major producer. The 600 hp. Model 33M Fairbanks-Morse diesel had been installed in 1930 and was rounding out 20 full years of service. This unit has run more than 70,000 hours and still retains its original pistons and cylinder liners. The 360 hp. Model VA F-M diesel went into service in 1925 and still averages well over 2,000 hours of work a year. Here again the design engineers have crossed up the accountants. This engine builder makes improvements in such a way that it is possible to modernize old engines in the field. The 25-year-old unit has been rejuvenated and brought up to modern performance standards. There was still this nasty business of finances to discuss and we plunged right in. Mr. Watkins hauled out the books and let us see for ourselves.

Well, in the five rough years from 1945 through 1949, Garnett's electric department earned a net profit of $141,964.12. For a town of just 2,500 population, that figures to $56.78 for every man, woman and child in the community. Table I gives the annual figures on kwh. generated, receipts, expenditures and profits. Unquestionably costs were higher than in 1941 when Garnett could hire its whole staff of plant operators for $360 a month, but expenditures were still moderate. Here's the plant operating picture for 1949:

Labor	$ 7,850.00
Fuel	32,103.97
Lube	1,272.52
Supplies	106.37
	$41,332.86

The plant engineers do all their own maintenance work and there were no repair expenses listed for that year. A little quick calculation shows that operating expenses at the plant were just 8.7 mills per kwh. Increased production volume has been an important brake on unit costs. Back in 1941, the plant's output was 2,465,700 kwh. and growth in the next five years was retarded by the war to less than 250,000 kwh. But the next five years saw a jump of more than 2,000,000 kwh. to an annual volume of 4,751,100 kwh. Peak loads rose from 590 kw. in 1941 to 710 kw. in 1945 to 1,125 kw. in 1949. Obviously, higher volume means larger income and also spreads overhead costs over more kilowatt hours.

Other factors help keep operating expenditures down. The new engine, which has the lowest fuel consumption in the plant, is operated an average of 16 hours a day, running normally from about 6 in the morning to 10 at night. The fuel now used is a special diesel oil of 25.5 gravity and the average fuel cost per gallon in 1949 was 8.1 cents, well below peak prices. Fuel is delivered by truck, stored in three 8,000 gal. tanks above ground. The oil flows by gravity to day tanks with float controlled admission valves and then is pumped through meters and filters to the engines. Mr. Watkins does not believe in economizing on the quality of lubricating oil but he tries to cut costs on handling and consumption. A good detergent oil is used in the big engine and is cleaned continuously in a purifier with cellulose filtration elements. A motor-driven pump puts scraper ring oil and lube from the crankcase through the purifier and back to the engine sump. The 1,400 hp. unit ran 4,250 hours before the purifier elements required repacking, a job that consumed just an hour. No lube ever is discarded and consumption is very low. In the past two years, the diesels have run better than 9,000 hp. hrs. per gallon of lube consumed. The adequacy of lubrication is attested by the long wear and low replacement of engine parts. A set of piston rings serves as much as 20,000 engine-hours. The three largest engines have oil-cooled pistons and pressure lube systems that include oil coolers and strainers. There are also motor-driven auxiliary lube pumps for use in starting and shutting down the engines.

The plant is situated on the shore of a small lake which provides a convenient and economical source of cooling water. Soft water is pumped through the engine jackets and through a pair of heat exchangers. Raw water is drawn from the lake, pumped through the exchangers and returned to the lake. Either exchanger can handle

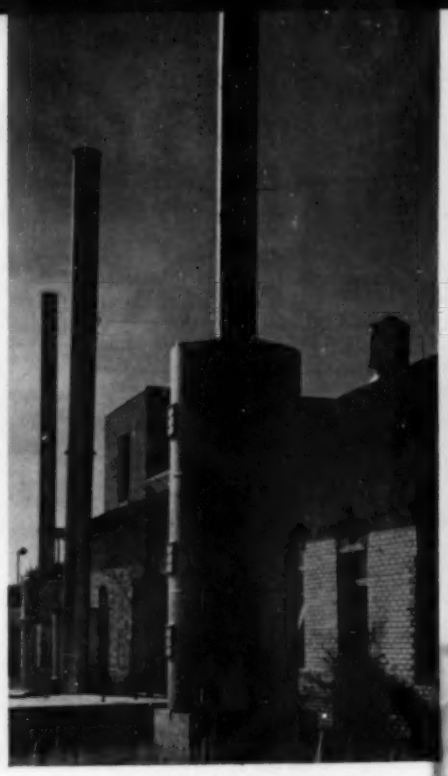
the entire plant. Lake water is used for the city water supply and makeup for the closed engine cooling system is drawn from the city purification plant. All intake air for the diesels is filtered. A duplex, oil-bath filter serves the 1,400 hp. engine. The engines are started with compressed air supplied by three air compressors, two driven by electric motor and one by a small gasoline engine. The alarm system on the new engine warns the operator if lube or jacket water pressure drops. Alert operating and an active program of preventive maintenance help to keep costs down. Ports of these two-cycle diesels are cleaned every five weeks. Pistons are pulled once a year and crankshaft bearings, injection nozzles and fuel pumps are checked. All maintenance work is handled by Supt. Watkins and his four-man staff. In determination of power policy, Mayor Charles De Wolf still is influential as he has been for 18 years. John Green is Commissioner of Utilities and Ralph Archer is Commissioner of Finance.

What does Garnett do with its power profits? Well, they don't like debt in Kansas whether it is private or municipal. Garnett paid cash for its last diesel and the plant doesn't owe a dime to anyone. City services are good and taxes are low. Free current is supplied for street lighting, water pumping, city buildings, parks and athletic fields. Power plant dollars help to pay for major public improvement. They paid entirely for the recreational facilities which include a beautiful 400 acre park with a 53 acre lake, a swimming pool, a golf course, a baseball field and a football field, each with a modern concrete stadium. We have never seen the equal in a town of 2,500 population. The city's residential rates range from a high of 6.5 cents to 3 cents a kwh. while industry is encouraged by schedules starting at 4.5 cents and scaling down to 1.25 cents.

We snapped a few pictures of the plant and then took a drive through the city park before leaving town. Yes, Garnett and its diesel plant were doing alright. If this is typical, the small-town power plant with good sound generating equipment can look forward to a long and prosperous future.

List of Equipment

New Engine—Model 33F Fairbanks, Morse.
Generator—Fairbanks, Morse & Co.
Lube Oil—Standard Oil of Indiana.
Reclaimer—Honan-Crane with cellulose elements.
Lube Oil Cooler—Ross Heater & Mfg. Co., Inc.
Fuel—Standard Oil of Indiana.
Fuel Oil Filter—Wm. W. Nugent & Co., Inc.
Jacket Water Pumps—Fairbanks, Morse.
Raw Water Pumps—Fairbanks, Morse.
Air Filters—American Air Filter.
Silencer—Maxim Silencer Co.
Pyrometer—Alnor, Illinois Testing Laboratories.



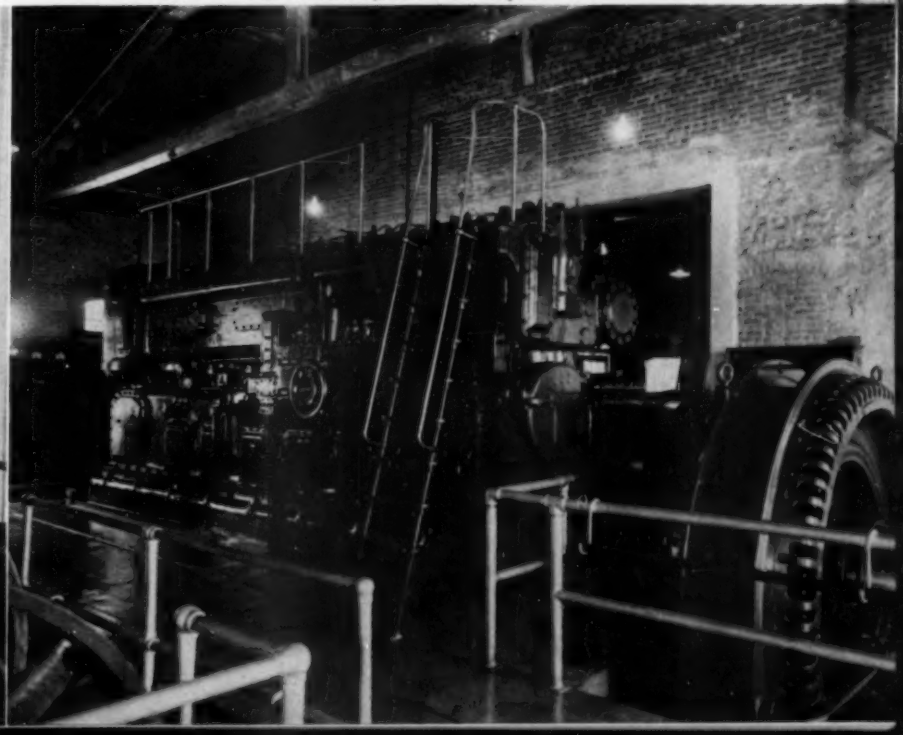
This view of the rear of the power plant shows the Maxim silencer, in the foreground, which serves the 1400 hp. F-M engine.

Table I

Year	Kw. Hrs. Generated	Total Elec. Dept. Receipts	Total Elec. Dept. Expenditures	Net Profit
1945	2,715,000	55,673.67	28,959.79	26,713.88
1946	3,235,700	65,086.71	31,533.66	33,553.05
1947	3,920,500	77,774.89	54,919.42	22,855.47
1948	4,307,700	96,922.33	71,425.95	25,496.38
1949	4,751,100	107,282.18	73,937.84	33,345.34
5 Yr. Total:	18,930,000	402,739.78	260,776.66	141,964.12

Lube oil for the 1400 hp. F-M diesel at Garnett is cleaned in this Honan-Crane unit. The Roper auxiliary lube pump can be seen at extreme right.

The latest engine to go into service at Garnett, Kansas, in mid-year 1949, is this 1400 hp., 7-cylinder, 16x20 in., Model 33F Fairbanks, Morse diesel. This unit operates an average of 16 hours a day, from 6 a.m. to 10 p.m.



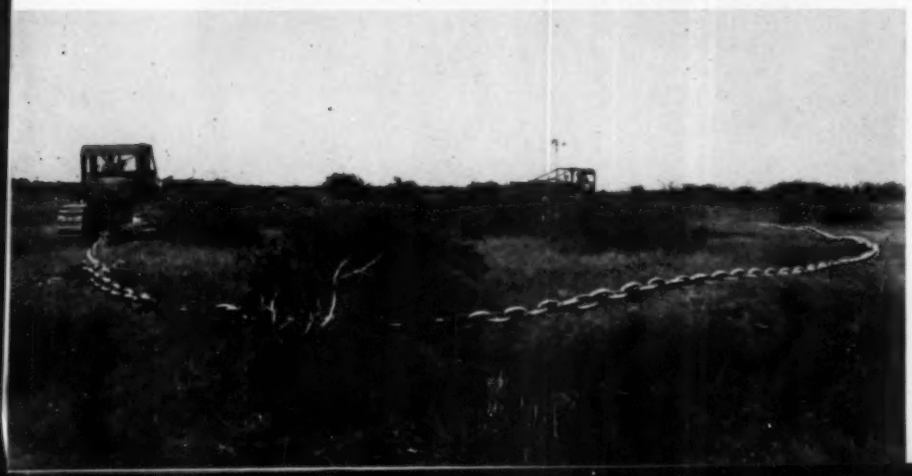
CHAINED DIESELS DO IT!

W. H. Grimes, land-clearing contractor, Stanford Texas, using two big diesel crawler tractors hitched to 400 feet of anchor chain in land-clearing operations.

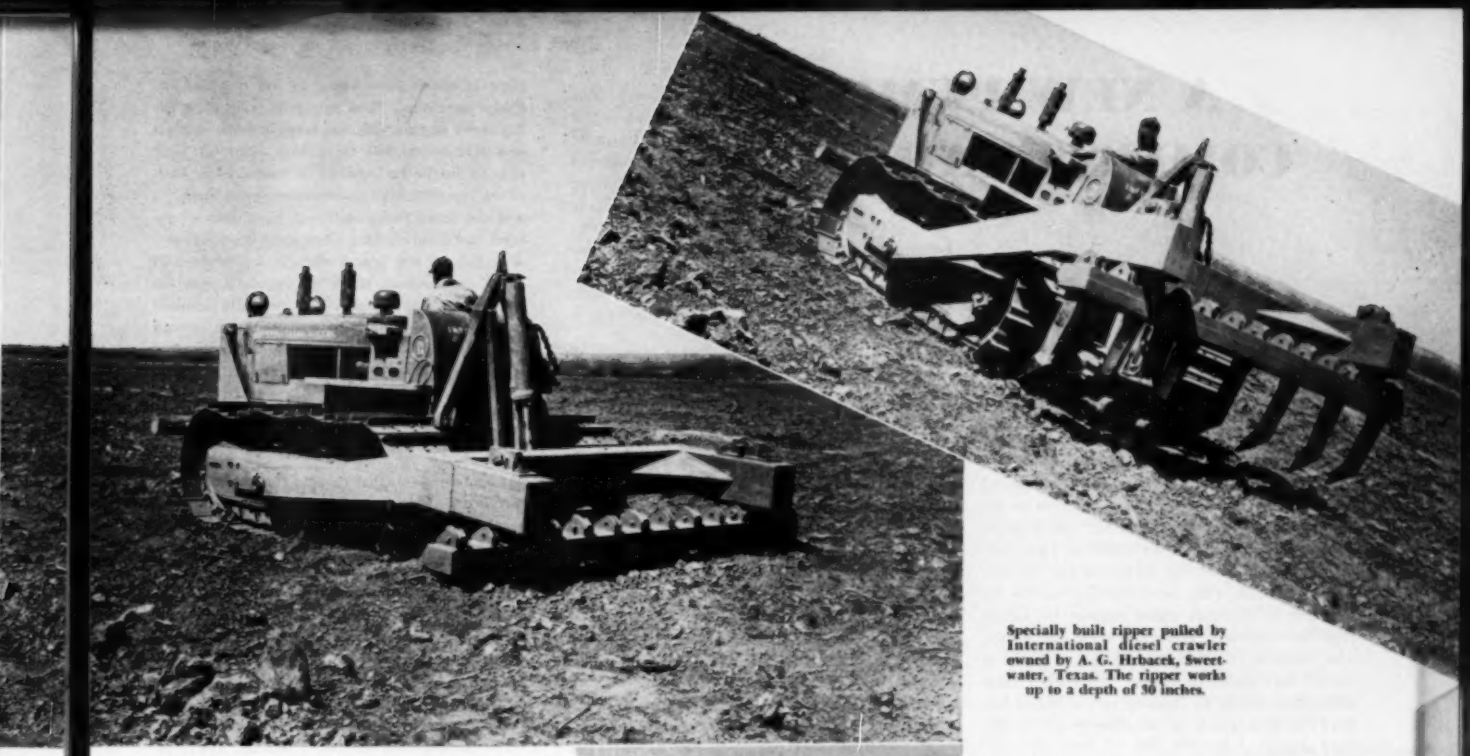
INGENIOUS and spectacular are the only words which adequately describe the method of land clearing employed by these Texas ranchers. Like big man-made tornadoes, these husky tractors, one at each end of a heavy anchor chain, knock down and uproot in big swaths mesquite, live oak trees, chaparral and prickly pear cactus bushes which infest so much of Texas pasture land. Inside the looped chain, amid the crackling and bang-bang of falling trees, race frantic rabbits, skunks and other animals, including rattlesnakes! For pasture clearing, knocked down and uprooted trees and bushes are left to rot on the land. Grasses immediately grow more profusely and because of the increased sunlight, their protein and vitamin content increases. The net result is greatly increased feeding capacity per acre and much improved grazing for pastured stock.

R. H. Welder performs this operation on his 75,000-acre ranch near Sinton with a big International 148-hp. TD-24 diesel crawler tractor hitched to each end of a 262-foot chain weighing 25,100 pounds. Each link of this chain is 13 inches long, is made of stock 3¼ inches in diameter, and weighs 99¾ pounds. Pushing and bulldozing their way through heavy thickets of trees and brush, these tractors provide a steady pull on each end of the weighty chain that causes brush and trees up to 22 inches in diameter to be uprooted. Mr. Welder also uses a specially made cylindrical chopper pulled by one of the TD-24's to break down the brush after the chain operation. The chopper is 24 inches in diameter with 8-inch blades straight across. The cylinder is filled with wet mud (baroid) to give it a total weight of 38,000 pounds. The resulting litter and trash, allowed to rot on the ground, facilitates the growth of forage grasses. Land clearing contractor W. H. Grimes of Stanford, Texas, make the same spectacular use of this method. He hitches an International TD-24 diesel crawler tractor and a Caterpillar D-8 to each end of 400 feet of anchor chain. Each link is of 1½-inch round stock and weighs 20 pounds. The chain is weighted down every 35 feet with 500-pound weights. The entire chain weighs 15,000 pounds. When working full blast, he clears at the rate of 20 acres an hour against the 40 acres an hour of Mr. Welder. Considering the former methods used, these are phenomenal rates of speed. In clearing for crop production, Mr. Grimes uses a special heavy root plow after knocked-down trees and bushes have been bulldozed into piles and burned. This root plow is essentially a heavy blade 8 feet, 8 inches wide which is worked 18 inches below the surface and is pulled behind the TD-24. Operating this root plow, fuel consumption is upped to 7.5 gallons per hour from the 6 gallons of fuel per hour on the chain dragging job.

R. H. Welder, land-clearing contractor on a 75,000-acre ranch near Sinton Texas, using two big International diesel crawler tractors hitched to a huge chain in clearing operations.



In two other applications of root plow work, Mr. Ted Johnson uses an International TD-18A diesel crawler tractor to pull a plow which is 6 feet wide and supported by 3- by 12-inch uprights. This plow works at a depth of 14 inches. The outfit owned by A. G. Hrbacek, land-clearing contractor of Sweetwater, Texas uses a specially built ripper pulled by an International TD-24 diesel crawler. This ripper works to a depth of 30 inches after the root plow whose blade is 9 feet, 8 inches long working to a depth of 15 inches has followed the land clearing operation. The ripper consists of 7 teeth 2 inches thick and spaced 2 feet from center to center.



Specially built ripper pulled by International diesel crawler owned by A. G. Hrbacek, Sweetwater, Texas. The ripper works up to a depth of 30 inches.

According to a Texas A. & M. bulletin entitled, "Brush Problems on Texas Ranges," forage grasses average 20.4 per cent more starches and sugars after land clearing than grasses grown in heavy shade and have less indigestible fibres. After telling how much of Texas, 100 years ago, was a rich grass pasture land, this same bulletin, a lengthy and thorough treatise on the subject, states: "The chief agent operative in the deterioration of Texas rangelands has been man and his overabundance of domestic animals. Year after year they have overgrazed the native forage grasses until they died from trampling and inability to produce and store food nutrients, and their places were taken by inferior grass species and the noxious bushes." Using available diesel equipment to do the job of inexpensively clearing undesirable growths from the land is the first step in restoring the rich Texas ranges to their former productivity.

The root plow used by Mr. Grimes is owned by Ted Johnson. The root plow is raised and lowered hydraulically. It is 6 feet wide and works at a depth of 14 inches.

A NEW PUMP FOR COMMON RAIL DIESELS

By F. HAL HIGGINS

A TIP from Publisher Rex W. Wadman about a new fuel injection system sent your old reporter over to call on Ernest V. Parker at his Pardeco office in Oakland. Mr. Parker, we found, is one of those pioneers who have done the unsung "blood, sweat and tears" work of ironing out the troubled pattern of diesel engine development over a period of 33 active years in the industry. "I went to the Seattle Construction Co. in 1916," he recalled, "and helped install Nelesco diesels in eight submarines." That same fall, he left to join the Seaborn Shipyards. They were working on the installation of auxiliary diesel engines for sailing ships for freighting. "When war broke out, my job was installing 10 Ferris-type steam engines in boats." Mr. Parker continued. "In 1919, I came down from Seattle to Oakland to the Moore Dry Docks as leading man in installing Pacific Werkspoor diesels."

By 1920, Mr. Parker was in the repair business, working largely on gas engines. But the following year he was over in Stockton with Holts of Caterpillar fame. In 1925, he went with Atlas in that firm's installing service. He was in on all those installations on tractors. Some of those installations of Atlas diesels in Monarch tractors are still operating after all these years. Mr. Parker traveled for Atlas till 1929 covering all the central U. S. from the Rockies to Erie, Pa. He did service engineering on boats, shovels, excavators, cranes, etc. and trouble-shooting for any grief that came up in that area for Atlas engines. "From 1930 to '36, I worked in various capacities, testing engines, assembly foreman, etc.," he added. "In 1936, I established a little shop of my own on the dock here in Oakland doing general repair and service work. I put out four installations of diesel engines, all Atlas; a crane, a towboat, a fishing boat, and a stationary. All had my new "Pardeco" fuel injection system on them. That towboat has been perking satisfactorily for two years. The fishing boat is o.k. after 18 months work. The crane has nine months work on it. All have given complete satisfaction. The fishing boat is the *Dorothy Ann* owned by Joe Ballesterier of Ballesterier of San Francisco. The Foy Tug & Barge is at Antioch. The crane is up at Klamath, Calif. working for the Klamath Cedar Co."

At the invitation of Mr. Parker, we moved to the back of his plant to watch him start an Atlas diesel equipped with his "Pardeco" fuel injection system. It started up easily and ran smoothly with little noise at speeds from idling to full throttle. Mr. Parker continued, "During my 33 years of servicing diesel engines, time has brought many changes and refinements but there have been no basic changes in the fuel systems in recent years. Each of the two prevailing fuel systems, the common-rail and the direct pump injection, have their advantages and disadvantages. Competent engineers predict that the new system when it does arrive will be of the common-rail variety in which injection is operated hydraulically. The generally accepted means of controlling combustion at the present time is individual pump injection for each cylinder. The common-rail system, however, is one of the oldest systems used in this country. It seems to have played its part since most manufacturers have deserted it in favor of individual pumps.

"It is my opinion that each of the systems has its advantages, that are well known to the engine manufacturers, and that they have played an important part in the success of diesel engines to date. I am firmly convinced, however, that a change in the fuel system is due, particularly for the heavy duty engines, that will overcome some of the known troubles. Years of experience in diesel engineering, production, servicing, testing, and experimenting has revealed many problems and caused me to continually seek an answer.

"The development of my "PARKER SYSTEM" began with a single discovery some fifteen years ago. It has progressed very slowly, however, each step has been convincing and fruitful, though expensive. Complicated, clumsy, designs and the long way around to accomplish a desired result were, of course, the initial steps. Knocking or noisy combustion, in a diesel engine, is the result of too rapid a rate of pressure rise, due largely to the

Figure 1

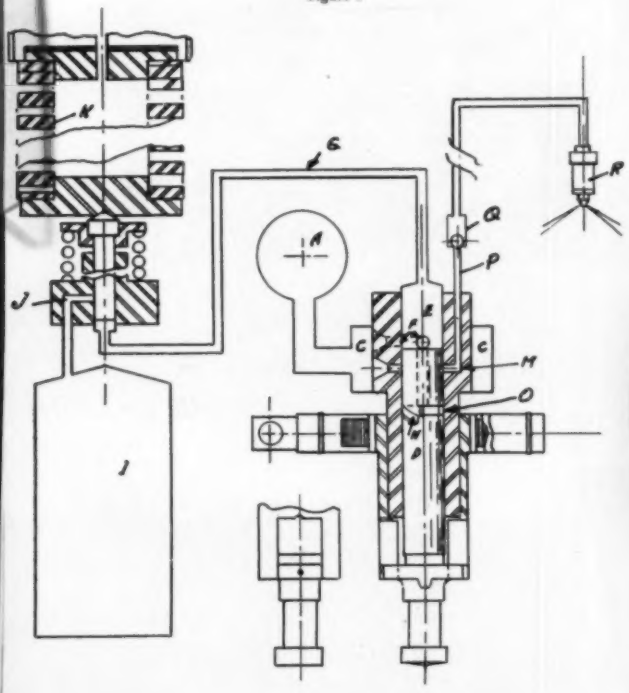


FIG- 1

Ernest V. Parker at his desk holding his "Pardeco" fuel injection system, the fruit of 33 years experience and study in diesel engines in marine, tractor, construction and stationary jobs all over the U. S. with emphasis on the rugged West.

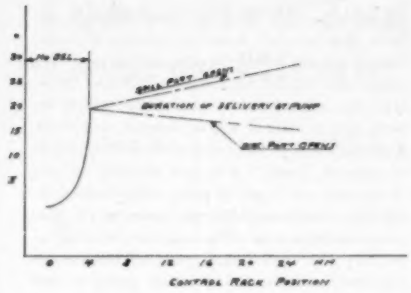


Figure 2

rate of initial injection of fuel, which does not add to the life of the engine or mean freedom from bearing trouble. The knowledge of this fact and efforts of some foreign designers to control initial pressures, by some form of pilot or double injection, led me to reason that the straight edge of a properly shaped helix approaching a round hole near the end of the stroke, when the plunger speed is low, should accomplish the desired result; maintain a low rate of injection during the initial part of injection.

"My experience with the common-rail and its high pressure receiver, which is stored-up energy in the fuel, made that feature seem desirable. Fuel relief valve troubles and my experimenting with them taught me that the fuel could be stored to a pre-

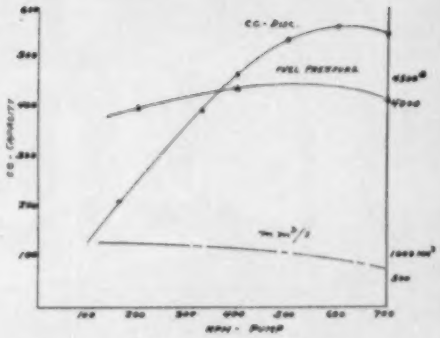


Figure 4

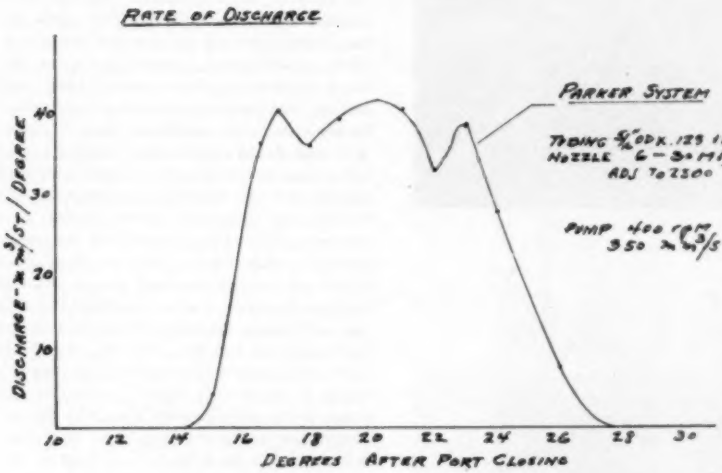
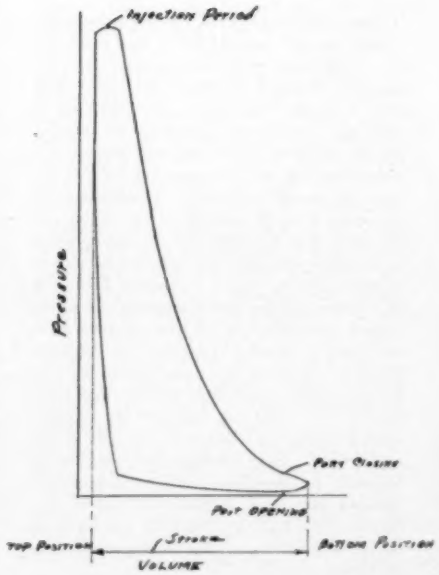


Figure 5

Figure 3

determined pressure and relieved through the same line. These principles and the strong desire to add something to diesel engine performance led to the present design of the PARKER INJECTION SYSTEM. Figure 1 is a schematic drawing, illustrating the principle and cycle of operation, which is as follows: Fuel in header or manifold A and under a low pressure, flows through passage B to chamber C, which surrounds the pump cylinder. When the plunger D is at the lowest position, fuel will enter through ports F to charge chamber E. As the plunger D raises, the ports F are closed and the fuel trapped in chamber E will be forced through passage G, against plunger H, which will be lifted to uncover port J, and allow fuel to enter chamber or receiver I. The valve action of plunger H will cover the port J trapping the fuel, until a pressure (determined by the spring K adjustment) is arrived at and at which time the fuel, under high pressure, will be returned through passage G to the discharge and spill ports. Plunger D has a drilled hole in the center of the plunger that connects with two helixes on the surfaces of the plunger, so shaped and positioned that they will control the discharge of fuel to the spray valve as the helixes come home in contact with ports L and M. The amount of fuel piloted to the spray valve will depend upon the rotated position of the plunger, which is carried out by means of a gear and rack attached to the reciprocating plunger, in the same manner as the conventional pump system.



Mr. Parker and a part of his crew outside the Oakland, California shop of the Parker Diesel Engineering Company.

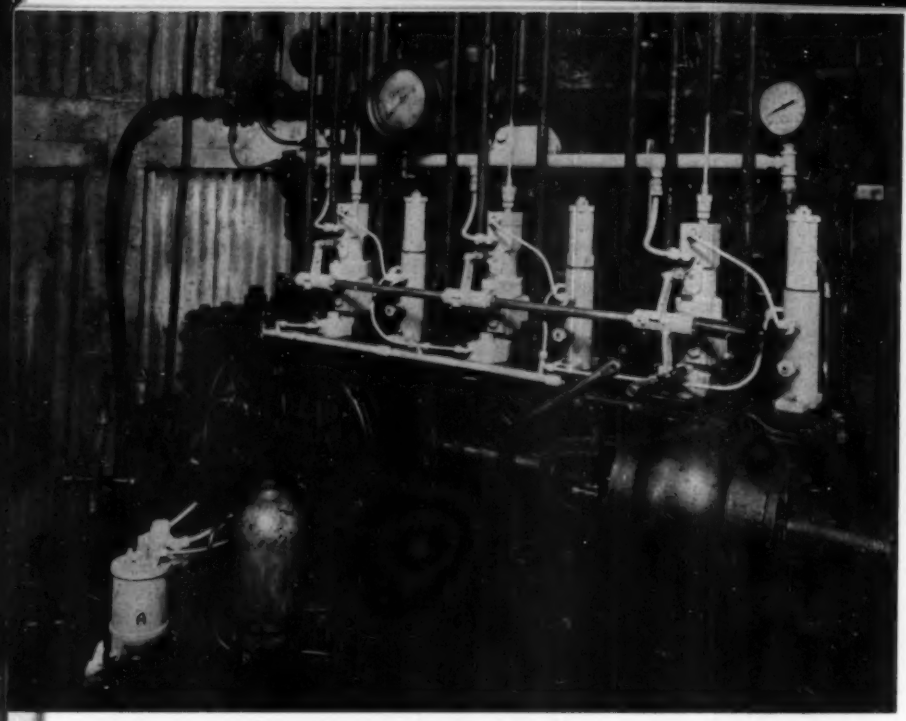
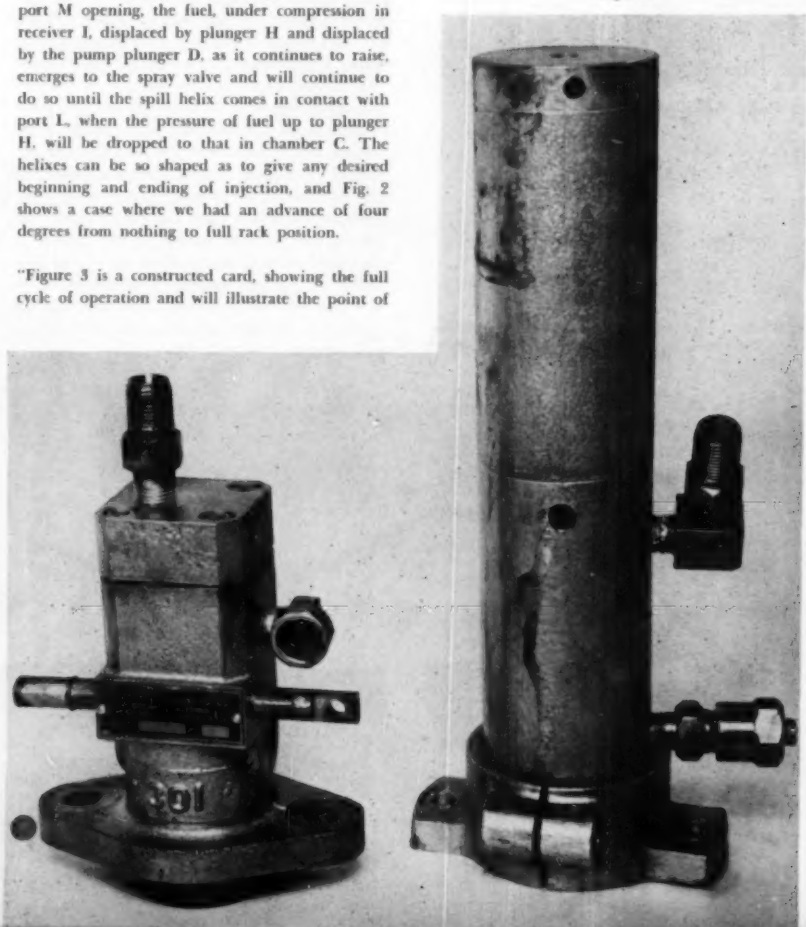


Figure 6

"Figure 2 shows the discharge period, in degrees, for different rack sittings and gives the point of cut-off for no load. As the discharge helix reaches port M opening, the fuel, under compression in receiver I, displaced by plunger H and displaced by the pump plunger D, as it continues to raise, emerges to the spray valve and will continue to do so until the spill helix comes in contact with port L, when the pressure of fuel up to plunger H, will be dropped to that in chamber C. The helixes can be so shaped as to give any desired beginning and ending of injection, and Fig. 2 shows a case where we had an advance of four degrees from nothing to full rack position.

"Figure 3 is a constructed card, showing the full cycle of operation and will illustrate the point of take-off of fuel for the spray valve. Figure 4 is a curve showing fuel discharge capacity, in cubic centimeters and the fuel receiver pressure, against pump rpm. together with the mm. 3/stroke curve. Here the increase in mm. 3/discharge per stroke as the rpm. is reduced, will be observed, and which is characteristic of the common-rail system that is so desirable. Figure 5 is a curve showing the rate of discharge per degree of pump shaft rotation for 350 mm. 3/stroke and 400 rpm. pump speed. The pump setting was for 13° pump shaft rotation, injection period, static timing, and it will be observed that curve 5 shows 13° injection period at 400 rpm. The sloping beginning and ending of injection is the result of the helixes contacting the round ports, which slows down the rate of port openings thereby accounting for a very quiet combustion, a part of my original objective. Tests run show no harsh combustion although firing pressures have run over 900 psi. This system uses an eccentric for pump action rather than a cam, which means smooth harmonic operations that put a minimum strain on springs, rollers, etc., meaning long life and freedom from such trouble. Figure 6 shows an installation on a 3-cylinder Atlas engine. The pumps mount where the spray valve lifter usually is and is under control of standard governor, through linkage and shaft. The receiver, with its pressure control plunger, is at the right of the pump, mounted on the cantra-frame. The small tank A is a patented device which collects all drainage from fuel pumps, etc., and puts it back into the system as it collects. This tank also works as an automatic valve to shut off the main supply of fuel from the tank, should too much fuel accumulate from any leakage while the engine is not running. Figure 7 shows the fuel pump of 1-cc/stroke capacity along with the fuel receiver prior to any mounting. In the usual pump injection system the delivery or discharge of fuel is governed by helical grooves in the plunger which serves to vary the percentage of the fixed stroke of the plunger during which the plunger actually delivers fuel to the injection line.

Figure 7



"In the PARKER SYSTEM, the fuel is put under a pre-determined pressure for all load conditions after which the quantity of fuel required by combustion is piloted to the spray valve, past a check valve in the discharge line. It takes advantage of stored-up energy in the fuel bottle for charging the fuel injection line the required amount. Secondary injection, stuttering and skipping have not given any trouble and improved combustion has been evident on all installations. The engine will idle down to a minimum and the combustion is quiet and smooth, improved performance such as smoother running engine, maintained balance of all cylinders, freedom from readjusting and setting of spray valves once they are removed, and a quiet combustion is the result of installing the PARKER SYSTEM. I do not claim increased power, for there are other design factors that enter into that. However, in most cases this has been accomplished without taking any chances. If the rpm. of the engine can be safely increased, the power can be increased, for there are no heavy mechanically operated parts such as push-rods, rockers, etc. Otherwise the PARKER SYSTEM will not limit the speed of the engine; that will be governed by the engine design."

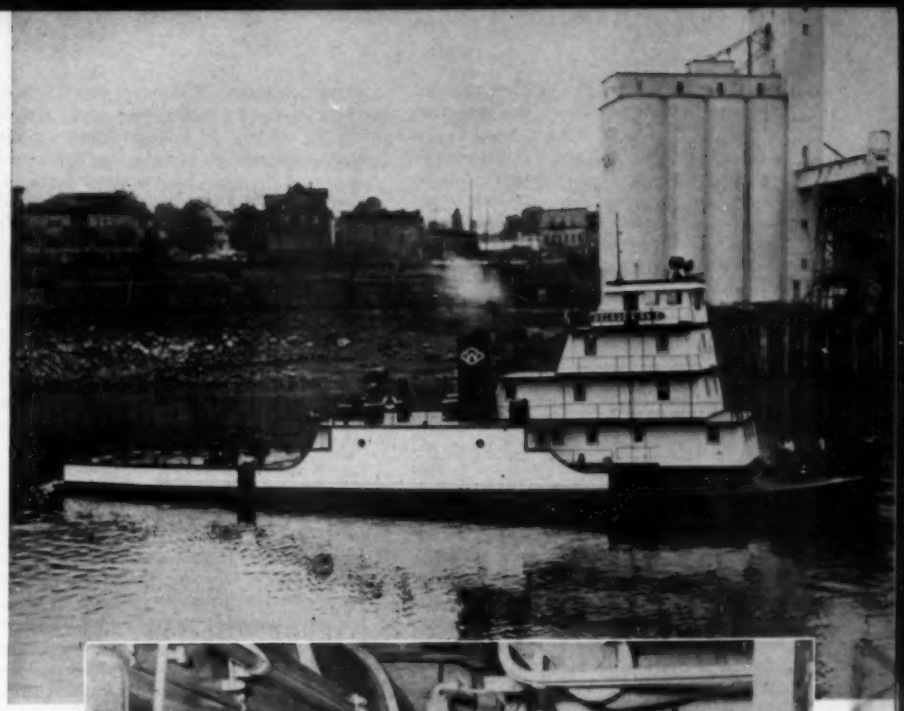
Converted Tug "George Birnie"

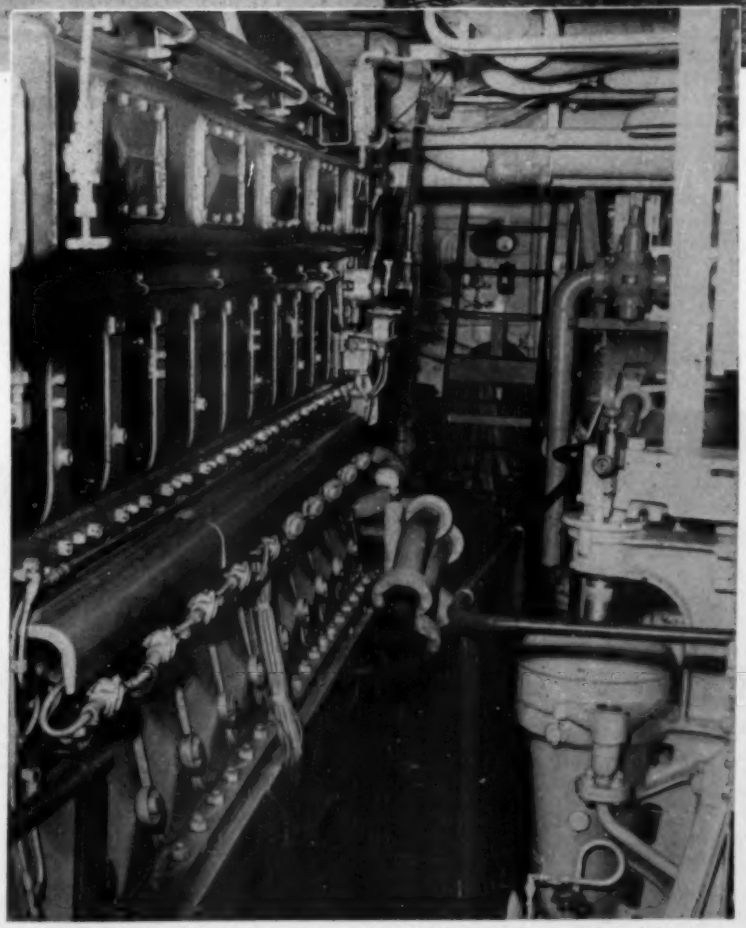
By CHARLES F. A. MANN

AFTER two years experience with a similar conversion of a former Navy LSM vessel into a powerful Columbia River tugboat, Albina Engine and Machine Works of Portland has "done it again" with the *George Birnie*, recently delivered to Western Transportation Company of Portland. Western Transportation is heavily involved in the Crown-Zellerbach paper empire and does all their heavy towing and lightering in the Portland area.

George Birnie was begun as a former U. S. Navy LSM vessel (No. 465), taken to the Albina plant, and approximately 100 feet of the bow section cut back to Frame 17 and scrapped. The remaining portion had a new bow section welded in place and a four-story deckhouse fitted to raise the pilot house to the highest possible level for working long strings of barges and log rafts, and meeting the innumerable drawbridges "eye to eye," including the locks through Bonneville Dam. As completed, the tug is 145 feet overall length, 34 feet molded beam; 11 feet 3 inches depth and a loaded draft of exactly 6 feet. Her diesel power plant makes her one of the most powerful on the river, and consists of two Fairbanks-Morse OP 38D8-1/8, 10-cylinder diesels, rated at 1,600 hp. each, direct reversible and with hydraulic couplings. The auxiliary generator sets are General Motors 3-268A units developing 100 kw. output at 440 volts ac. All pumps and motors throughout the vessel are ac. and a ship to shore cable is used in port.

Because of the necessarily shallow draft hull, the main deckhouse is practically all engine room, with flat decks fore and aft. Galley, crew's quarters and engineer and captain's quarters occupy the three forward levels, with the pilot house atop. Slanting steel walls on the fore and aft parts of the deckhouse eliminate some of the boxiness and give her a peculiar cocky apearance. Two Worthington 4-inch centrifugal fire and flushing pumps and two 2-stage Worthington air compressors are fitted, and a full set of Harrison water and lube oil coolers, working on a skin cooling system, are fitted. Two U-shaped channels are welded to the outside skin of the hull, through which fresh water is circulated in a closed system, thus making it unnecessary to filter river water for cooling purposes. Purolator lube oil filters are fitted as well as two Sharples lube-diesel purifier units. A 1,600-gpm. Gardner-Denver ballast pump, a 2-inch Allis-Chalmers sanitary pump and two 5-hp. York refrigeration pumps are fitted. Multiple rudders, operated by a Sperry Electro-Mechanical (No. 2) steering gear are fitted behind the twin propeller tunnels, to permit rapid maneuvering in wild river water. Twin Henschel engine room telegraphs, Carlisle & Finch headlights are additional equipment items. Since the size of the tug and the long runs away from port make it necessary to provide for a crew of 14, comfortable quarters and a large 100 per cent electrified galley is provided. The elaborate redesigning of the hull and all mechanical layouts were originated and executed by the Albina Engine and Machine Works own staff, and much was learned in the conversion of the sister ship *Peter W.*, also for Western Transportation Co., two years ago, was incorporated in the *George Birnie* conversion.





WAVERLY,

By ROBERT . GR

ONE of the most modern and best equipped plants in the Middle West is that owned and operated by the City of Waverly, Iowa. Typical of many of the municipal plants in this territory this plant has shown a healthy growth for several decades past. Under the able supervision of Mr. Glen Yarger, the plant has made excellent strides and the City of Waverly and its citizens can well be proud of a municipal plant, second to none in the territory.

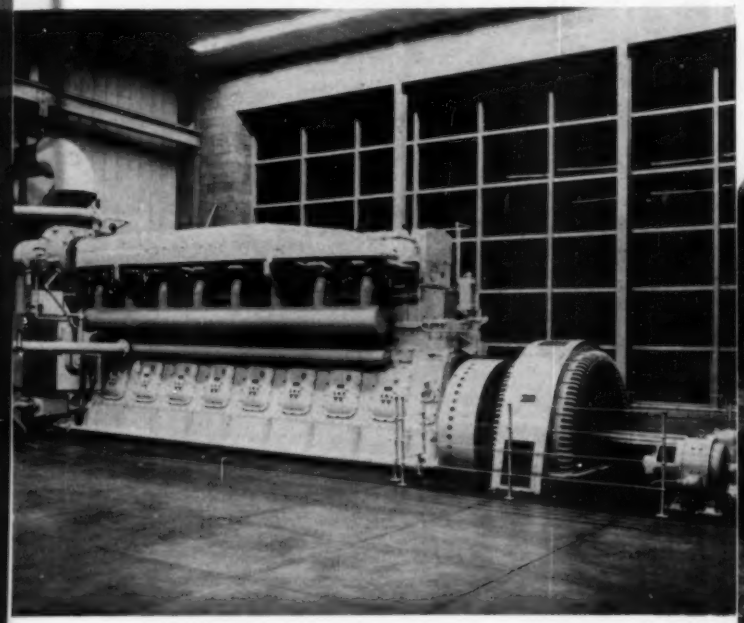
The electric system of Waverly had its beginning in the early part of the century, when the municipality purchased the holdings of the Healy Electric Light Company, an old hydro-plant on the Cedar River. At the time of purchase, direct current units were in vogue. The city, however, felt the need of expansion of the plant, and in 1920 these old units were discarded in favor of three new hydro-electric units operating alternating current generators. This equipment was also augmented by the installation of some steam driven equipment, and the system requirements further augmented by purchased current, since the load became too great for the water power available. In 1938 the plant was further expanded by the purchase of three Worthington diesels, one of 250-kw. capacity and two units of 430-kw. capacity. These units were installed in a building next to the hydro plant. In 1942 the load demand increased to a point where a fourth diesel unit was necessary, so another Worthington unit of 750-kw. capacity was added to the diesel plant. With a firm 200 kw. from the hydro-plant and with the largest diesel unit out of service, the dependable capacity of the plant was calculated to be approximately 1,310 kw. By 1946 the plant load had increased to such an extent that the system peaks were running approximately 230 kw. above the installed dependable capacity. To overcome such a situation, it was decided to increase the speeds of the three largest diesel units and install superchargers. At the same time, this procedure involved other major improvements such as oil cooled pistons, new cylinder liners, new camshafts and added generator capacity. As a result of these changes, the installed capacity was raised to 1,890 kw.

But the demand on the plant continued to grow and with thought of the future, the city fathers decided to call in a reputable engineering company and have a survey of the situation made. This contract was awarded to the Stanley Engineering Company of Muscatine, Iowa. Further expansion on the site of the old plant, known as the East plant, was out of the question, since no more available space could be had at this location. With this situation in mind, it was decided to chooose a new location for further equipment and at the same time the question arose as to whether the new plant should be a steam plant or another diesel plant. When all factors were considered, it was finally decided to purchase diesel units and to build a modern diesel plant on a new site now known as the West plant. This plant site was chosen because of its close proximity to an available railroad siding for the delivery of fuels and materials and to get away from flood hazards of the Cedar River.

Another question which arose at this time was as to the proper size of the new plants. Since the plant demand was growing by leaps and bounds it was decided that the next unit should be of at least 1,200-kw. capacity. Here again the city fathers showed foresight in the planning and building of the new West plant. Profiting by past experiences, and realizing that the growth of the load demand on the plant would be increasing, they provided a building and facilities to care for future needs. The new building is shown in Figure 1 and now houses an 8-cylinder, 1,245-kw., solid injection, 4-cycle supercharged unit, shown in Figure 2. Figure 3 also shows this unit from the generator end and you will note that ample space has been

*Chief Engineer, Muni l Light Hillsdale, Michigan.

Eight-cylinder, 1,245-kw. Worthington dual-fuel diesel direct-connected to an Elliott generator. The latest addition to the Municipal Power Plant at Waverly, Iowa.



RY, IOWA

ERT . GREGORY*

provided for the installation of two more units. Many new features are incorporated in this installation, and while too numerous to mention, some of the chief ones are that the super-charger is turbine driven by exhaust gas. This unit, which is also a Worthington, is believed to be the first unit employing Worthington's new dual plunger fuel pumps, and though gas was not available at the time of installation, the unit is equipped for dual fuel operation. The exciter is chain-driven and the generator voltage is controlled by the exciter field rheostat when the unit is being brought in, and then by a voltage regulator after it is in service. Thus no generator field rheostat is used.

Other features incorporated in this installation are the handling of the scavenging air which is handled by modern air equipment, using a continuous cleaning, oil-coated filter. Modern fuel and lube oil filters are a part of the equipment. Purifiers are installed in the lines between the above-ground storage tanks and an underground purified oil tank of 5,000 gallons capacity. Under present operating conditions, the new unit is used for peak service requirements and is operated only a part of the 24-hour daily period. Plans for the future call for the installation of an additional new unit, similar to the one already installed. For the third unit in this plant, it is the intention of those in charge to move the largest unit from the East plant to the West plant, and make the West plant handle the base load and use the old plant as the standby and peak-load plant.

Much of the credit for this fine installation must be given Mr. Yarger and the Stanley Engineering Company. The same care and vigilance given to the new plant is also lavished on the old plant, and the citizens of Waverly can well be proud of their Municipal plant. The following figures which were furnished us by the Stanley Engineering Company, show the growth and future prospects of the peak loads and output of the plant as estimated by them, and we are indebted to the Stanley Company for this information and the fine pitcures of this plant.

From the above figures, which are estimated, it can readily be seen that the costs of diesel operation are slightly lower than those of the steam operation as of date. The difference in the foreseeable future may be due to fuel costs, since we all know that fuel oil is going up in price while coal is coming down. However, this point is debatable in the writer's mind, and under present conditions costs per kwh. generated in either case are close.

ANNUAL PEAK LOADS, 1943-1950

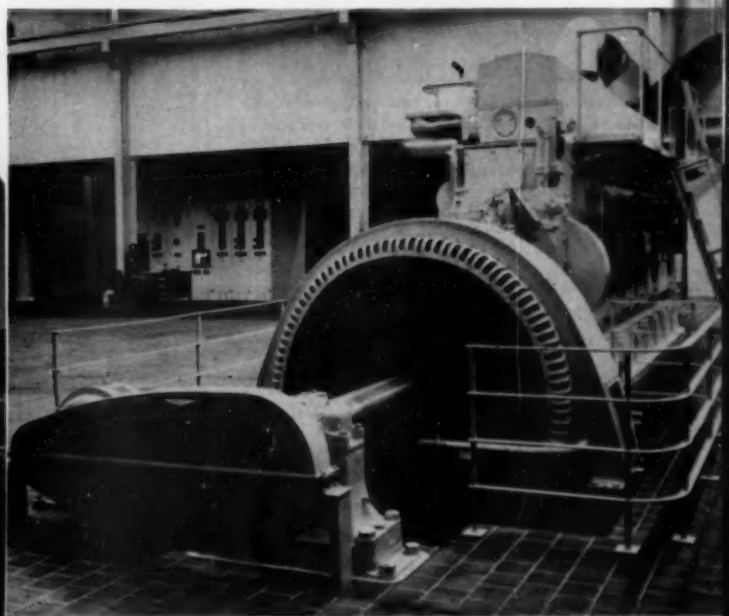
Year	1943	1944	1945	1946	1947	1948	1949
Peak kw.	1,100	1,340	1,480	1,540	1,600	1,900	2,225
Increase over previous year		240	140	60	60	300	325

ESTIMATED UNIT COSTS

Period	Immediate Future		Foreseeable Future	
Estimated peak-kw.	2,200		4,400	
Estimated annual generation kwh.	10,000,000		20,000,000	
Equipment	Diesel	Steam	Diesel	Steam
Operating costs in cents per kwh.	0.77	0.69	0.66	0.56
Fixed charges	0.17	0.27	0.16	0.20
Total (gross) cents per kwh.	0.94	0.96	0.82	0.76

er, Muni l Light & Power Plant,
igan.

Looking at the Electric Machinery generator end of the new 8-cylinder dual-fuel Worthington diesel installed at Waverly, Iowa. Ample room has been left in the new building for at least two engines of similar capacity.



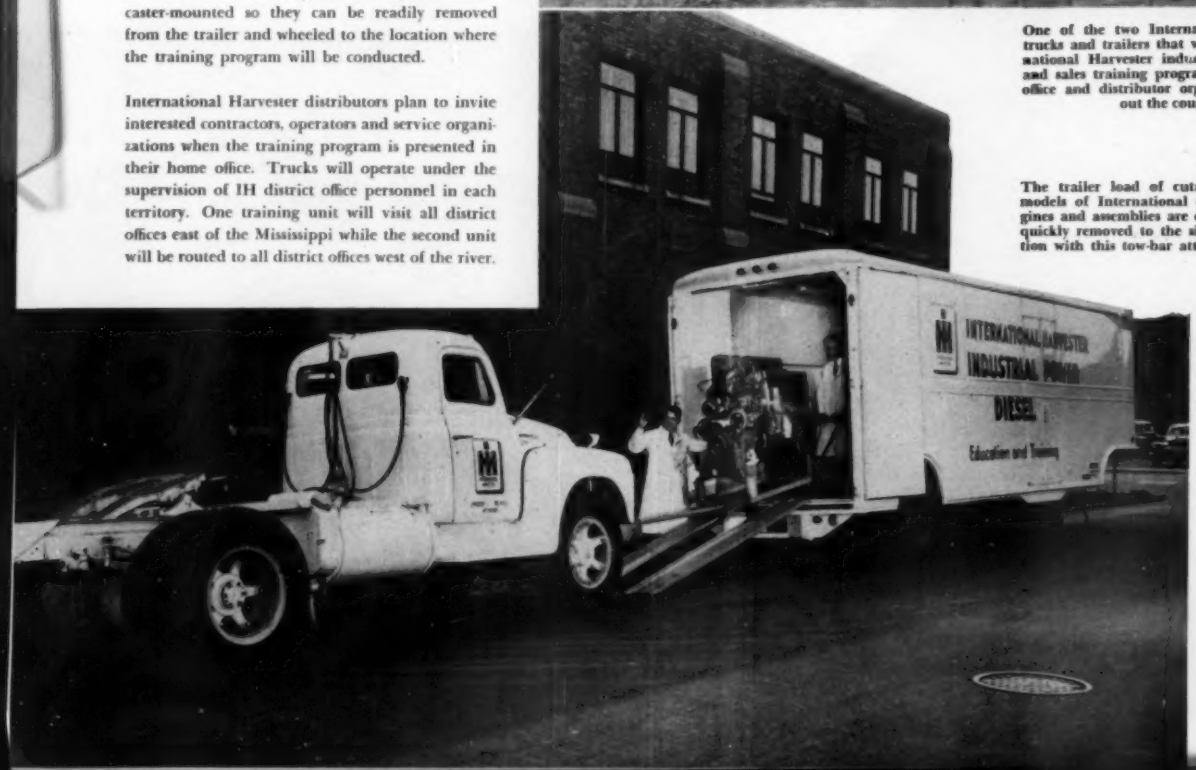
MOBILE DIESEL SCHOOL

THE latest service and maintenance information on International Harvester industrial power products will be brought to the company's district office and distributor service personnel by two mobile training units that start a nation-wide tour this month. "Our mobile training units will enable us to give our customers greater than ever after-sale satisfaction because of the continuous mechanic training we will conduct through this streamlined service program," states Fred J. Schreck, IH assistant general supervisor of industrial power service.

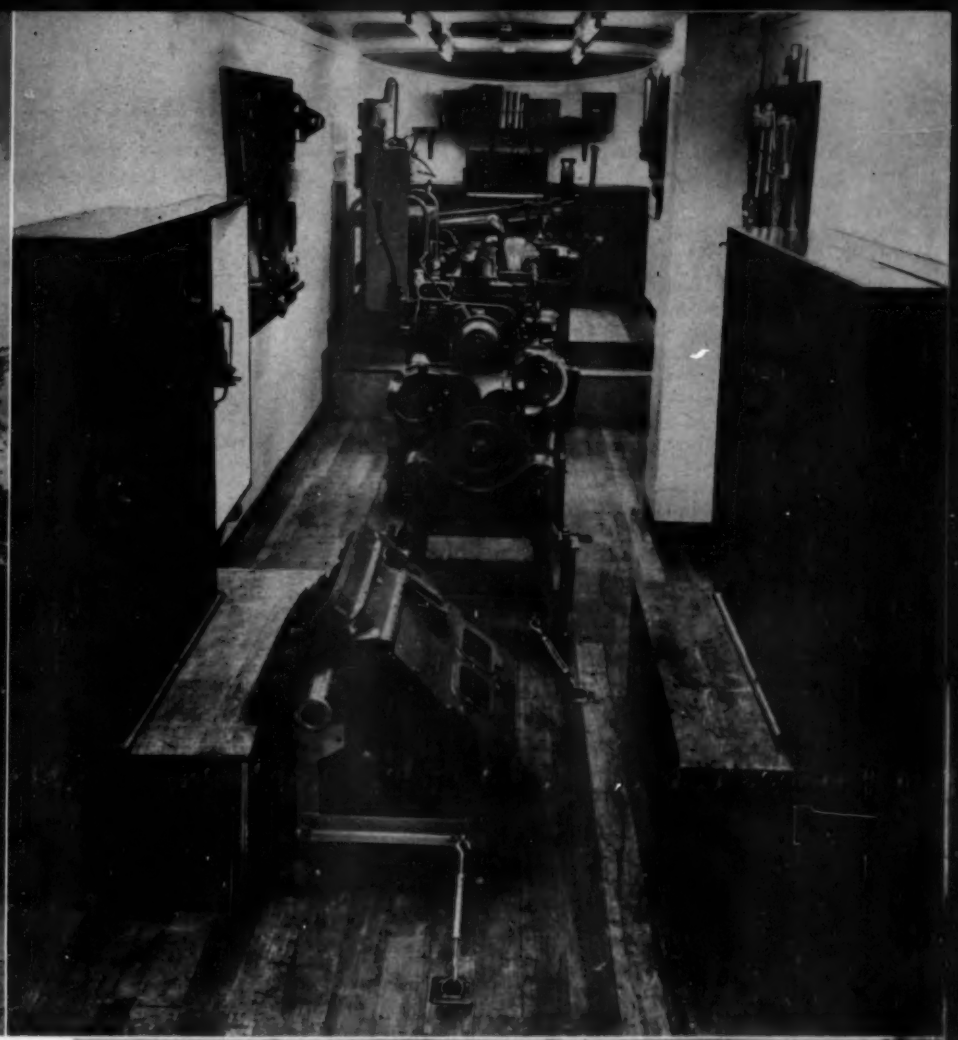
Each unit consists of an International L-180 series truck with a 32-foot, drop-frame, enclosed semi-trailer, especially equipped for both a service and a sales-training program. Manning each unit will be two instructors with extensive field and factory experience who qualified for their assignments only after an extensive training program. The instructors will present the International product servicing story with the aid of charts, slide films, and movie films. Sets of special tools and equipment will be displayed on the walls of each trailer and usage will be detailed during the discussion period. The presentation will be highlighted by the use of cross-sectioned working models of various International crawler tractor components including transmissions, hydraulic units, final drives, diesel engines, tractor roller, and steering clutches, plus a complete fuel injection system laboratory. While the fuel injection system classes will be presented in the trailer laboratory, all cutaway models are caster-mounted so they can be readily removed from the trailer and wheeled to the location where the training program will be conducted.

International Harvester distributors plan to invite interested contractors, operators and service organizations when the training program is presented in their home office. Trucks will operate under the supervision of IH district office personnel in each territory. One training unit will visit all district offices east of the Mississippi while the second unit will be routed to all district offices west of the river.

One of the two International L-180 series trucks and trailers that will carry the International Harvester industrial power service and sales training program to every district office and distributor organization throughout the country.



The trailer load of cutaway and working models of International crawler tractor engines and assemblies are caster-mounted and quickly removed to the site of the presentation with this tow-bar attachment for truck.



Interior view of the 32-ft. trailer showing the caster-mounted models, the display of special service tools and equipment, and the complete fuel injection system laboratory.

An instructor points out the operating details of the fuel injection pump stand in the complete International fuel injection system laboratory built

Diesels Building New Dam

Nearly All Equipment on the Whittier Narrows Dam Is Dieselized as Work Starts on the $36,000,000 Project

By FRED M. BURT

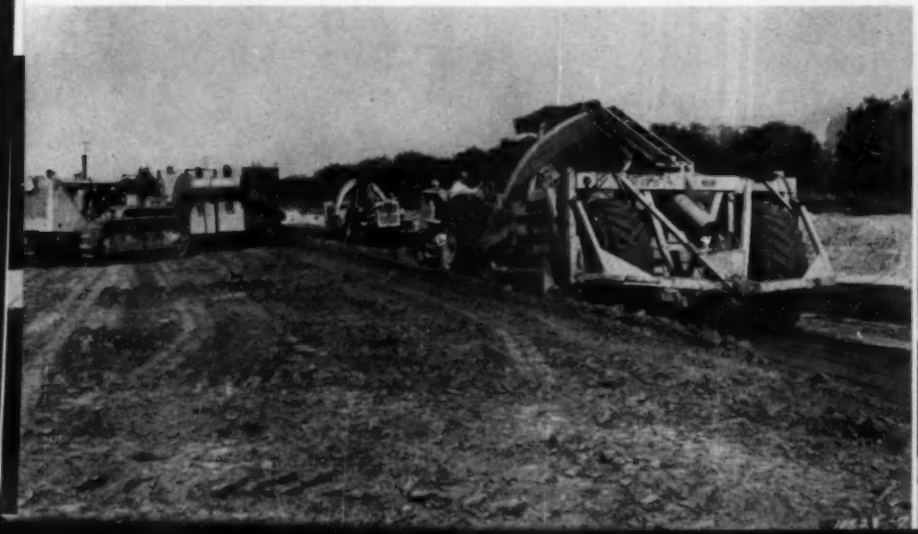
WITH work pretty well along on the first contract let to Winston Bros. Co., Azusa, Calif., on the huge Whittier Narrows Flood Control Dam Project, dieselized equipment can be found at work all over the place. Two jobs just completed were especially interesting; compaction of the 7,000-ft. long upstream east bank, and a fast earth-moving operation with new model, single-engine (Cummins diesel) Euclid scrapers. This east embankment, in the completed straight sections ranges from a little over 20 ft. above present ground levels at the lower end, and tapers down to about 10 ft. at the upper end. First laid was a clay core, 32-ft. bottom width, 20 ft. at the top and 12 ft. high at the lower end of the embankment. The clay was applied in 12-in. layers and compacted with the new Southwest Welding & Mfg. Co. Model HCR-4 heavy duty compaction roller (its first time use except for test work). The clay was brought from a pit two miles away, in ten Euclid end-dump trucks, 30,000 lbs. payload capacity, powered with Cummins 165-hp. diesels. The compaction roller was pulled by a D8 "Caterpillar" tractor, operating in fifth gear and souped-up to about 6-mph. speed. The D8 and roller combination was also used on the earth fill over the clay core, and according to the foreman in charge, was the best and fastest compaction equipment he had ever used or seen. The upstream slope, predominantly at 1:2½ is to be faced with a 2-ft. cobblestone blanket.

Also included in the $3,002,475 contract is the construction of a 530-ft. long concrete spillway to contain 9, 50-in. wide, radial gates and a downstream, west bank, 3,000-ft. levee with rock-facing. The 8-ft. thick, spillway foundation slab will be built in three monoliths, each with three 182x37 pours. In order to consolidate the spillway foundation, a 40-ft. high pre-load fill, 595 ft. by 140 ft. on top with 1:2 side slopes, and earth ramps with 1:10 slopes for earth-moving equipment, was placed, and contained nearly 250,000 cu. yds. of earth. Six LeTourneau "W" Carryalls with Caterpillar D8's, loaded random, impervious borrow from the San Gabriel River channel, to build up the pre-load fill, and 2 LeTourneau "FP" Carryalls with D8's built the ramps. Four D8's were used as push tractors for loading. The San Gabriel's near-surface water level was kept lowered a few feet through constant operation of 2, 1,350-gpm. Fairbanks-Morse, unidrive turbine pumps from which the water was carried by pipes to canals dug by draglines, which discharged into the river bed at downstream lower levels.

After a 90-day settling period, the pre-load fill was removed, principally to a stock pile, averaging a 1,500-ft. haul to dumping point. Most of the earth-moving was done by 3 single-engine Euclid scrapers, with two Cat D8's used for loading pushers. Speedily scooping up loads of about 16 cu. yds. of fill earth, round trips to stock pile and back were made in about five minutes, adding to an earth movement of nearly 600 cu. yds. per hour with the 3 units. At the same time, the Carryalls were kept busy excavating at the wetter, lower levels. Grading was done with No. 12 Caterpillar motor graders. The first 1,200 ft. of the downstream levee was faced with 27,000 tons of 3 to 8 ton, blue granite rocks, to a thickness of about 5 ft. over a 2-ft. layer of spall rock, after, the embankment was shaped principally with a Northwest 80 dragline, powered with a Murphy diesel and using a 3 cu. yd. bucket.

The facing was sub-contracted to J. B. Stringfellow, Riverside (Calif.) contractor who specializes in rock work, also operating a large blue granite quarry. After these rocks were blasted out at the quarry they were loaded with two Northwest 6 shovels on trucks and trailers of several makes, mostly diesel. Averaging about 24 tons per load, 15 to 18 of the hauling units were kept busy in the 39-mile haul. The rock was all placed with an Owens 15-ton rock grapple with 6-ft., 5-in. tine opening, mounted on the 65-ft. hammerhead boom of a Northwest 71 crawler crane. The grapple handled about 900 tons of rock per 8-hour day, though having a 200-ton-per-hour capacity. The water level at this point was kept down by 3, 1,440-gpm. pumps powered with Waukesha (2) and General Motors diesel engines. A complete shop at the dam site, with 3 mechanics and helpers is kept busy overhauling equipment. The Whittier Narrows Dam, only about 10 miles from downtown Los Angeles is the last and biggest unit of the over-all floor control project to protect a large area, rapidly being built up from disastrous floods such as have occurred 5 times in the past 67 years. The San Gabriel drains 554 square miles of the mountainous Angelus Forest. The Rio Hondo is an old San Gabriel River bed, with the new one cut during a flood. The whole project will span nearly 3 miles between the Puente and the Merced Hills.

General view of spillway site with lower end of east embankment in far background. In foreground Cummins scrapers.

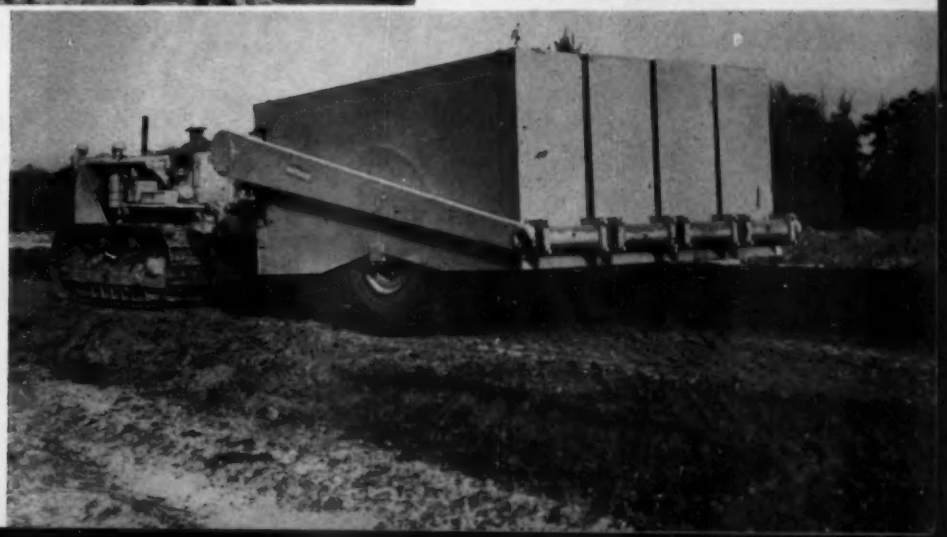


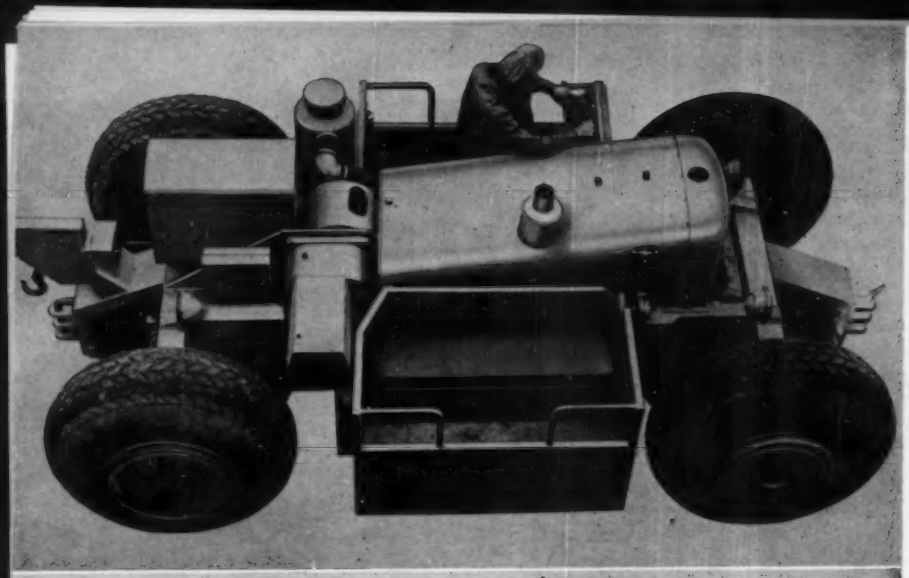
Placing and compacting clay core of east embankment—at right are LeTourneau Carryalls with D8 Caterpillar tractors and a D8 with new Model HCR Southwest heavy duty compaction roller.

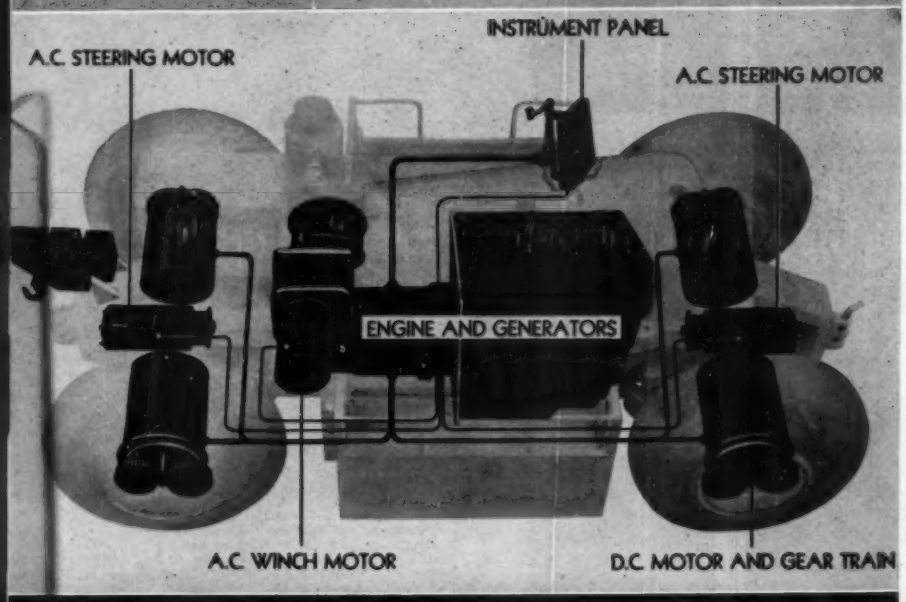
Euclid scraper with Caterpillar diesel D8 pusher picking up about 16 yds. of earth at a time. This Euclid scraper is powered with a Cummins 275 hp. diesel engine.

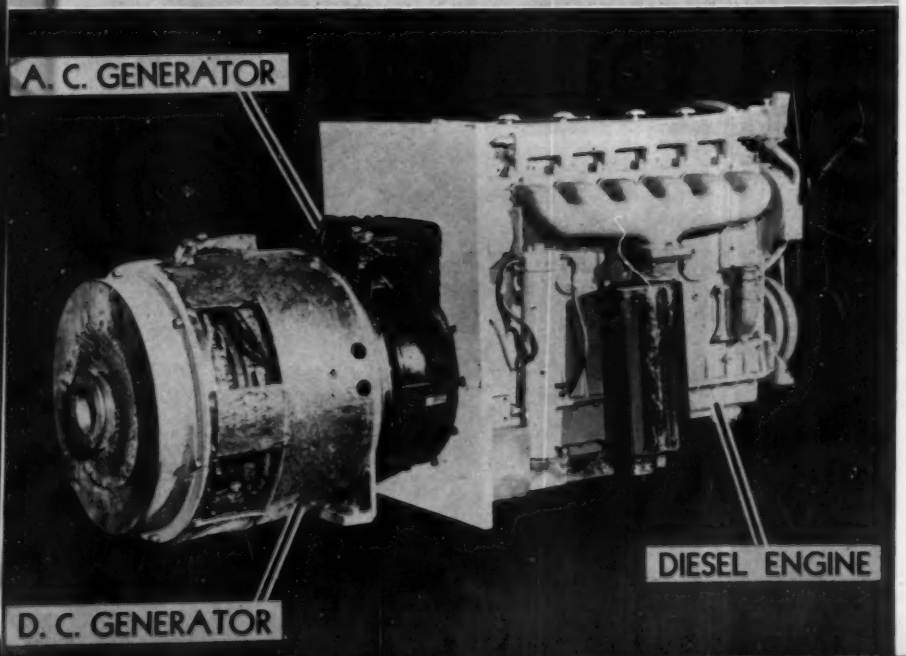
Powered with a Caterpillar diesel this Northwest 80 dragline with 3 yd. McCaffrey bucket is dredging out canal to carry away excess water in order to lower the water table.

A Caterpillar diesel D6 tractor pulling a Southwest HCR-4 compaction roller, loaded weight 60 tons; rolling width 10' 6"; turning radius 15'.









SOMETHING NEW AND DIFFERENT

LeTourneau Announces Tournatow, First Machine to Put Diesel-Electric Drivers On Rubber-Tire-Mounted Heavy Equipment

A MACHINE with no clutch, no transmission and no differential, and which incorporates a new method of power transmission as used on heavy construction equipment – that's the new electric drive Tournatow, just announced by R. G. LeTourneau, Inc., Peoria, Ill., pioneer developer of high-speed electric-control earthmoving machines. The Tournatow solves the problem which limit the wide use of the electric automobile: no self-contained source of electric power. The Tournatow uses its own diesel engine to generate its own electric power. Its alternating and direct current generators are driven by its diesel engine and provide power for all steering, forward, reverse and lateral movements and for the winch operating through a patented fairlead. This self-generated current is conducted through electric-wires to an electric motor and gear arrangement contained in the assembly of each of its four wheels. There are only four moving parts in each wheel – the pinion, two reduction gears and the internal gear within the wheel.

The effectiveness of its system of drive is attested to by the tremendous pull it can exert. In a recent demonstration conducted for the Air Force at Wright Field, Dayton, Ohio, the machine developed a pulling power sufficient to maneuver giant aircraft weighing approximately 400,000 pounds, which is more than 16 times the weight of the Tournatow. So powerful are the A. C. motors that one 11 inches in diameter can develop 50 hp. These motors develop instant pulling power and can accelerate from standstill to a top speed of 3600 rmp. in 1/6 of a second. They can stop and reverse themselves to 3600 rmp. in 1/4 of a second. Operation of the Tournatow is simple. The throttle for its diesel engine is advanced to turn the generators at the required speed. The regulation of the flow of electric current from the generators to the wheels is accomplished through a device called the potentiometer, the action of which is similar to the speed and controller on street cars. Characteristics claimed by the manufacturer for Tournatow are its ability to develop a smooth start, a smooth pull and quick, easy stops. A power stop can be accomplished simply by returning the controller to "off" position. The characteristic regenerative braking effect of the D. C. motors is used to great advantage in this application of the D. C. system. Operating on grades where the tendency of the

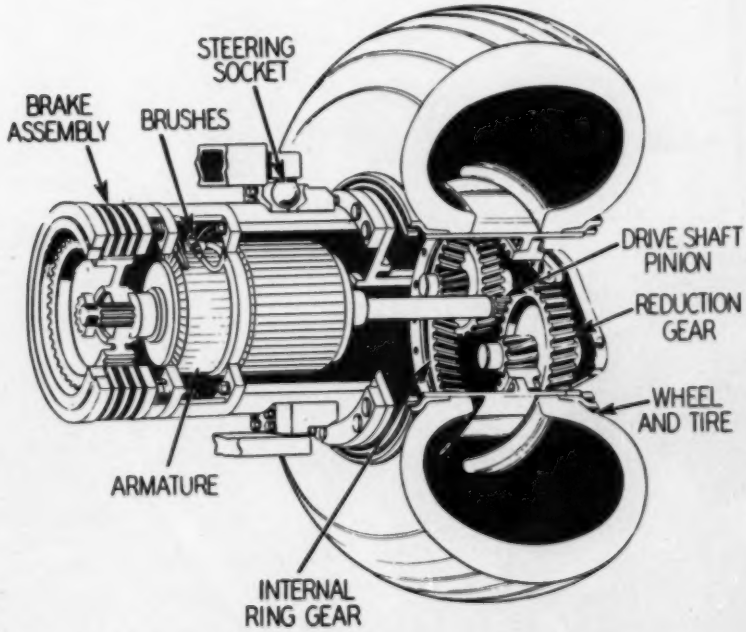
load is to overspeed the motor in conventional units, the D. C. motors automatically take on the work of retarding the load.

This effect eleminates the necessity for a braking system used during operation. However, since this effect does not exist as long as the motor armature is at rest, a parking brake is built onto the motor. This brake is a multiple-disc, magnet-released, spring-engaged unit, mounted on the rear of the motor frame. As long as current is flowing in the D. C. system, the magnet is disengaging the brake. When current is cut off, powerful springs engage the brake and lock the motor armature, holding the load in position. The manufacturer also states that after the diesel engine has been started and the throttle opened, no further use of the engine throttle is necessary.

The Tournatow is powered by a military standard G.M.C. 6 cylinder, 2 cycle diesel engine capable of developing 186 hp. at 1800 rmp. Two generators, one alternating current and one direct current are mounted in line with the engine. The D. C. generator supplies power to each of the four drive wheels. The power is applied indirectly through the potentiometer type rheostat for precision control. The A. C. generator supplies power to each of the two motors used to steer the front and rear wheels and to the motor operating the large capacity winch on the rear of the unit. This power is controlled by individual switches mounted on the control panel. The "three unit" power plant – the engine, the A. C. generator and the D. C. generator – is held in position by four mounting bolts and can be removed with ease and dispatch should any overhaul be required. Connection between the power plant and the motors – drive steering and winch – is through flexible electric conductors and the motors are placed at the points of application. Stranded cable, covered with a tough insulating sleeve, is used in place of solid wire wherever possible, since the stranded cable, with minimum space loss between strands because of their small size, occupies less space then solid wire windings of the same carrying capacity and cross section.

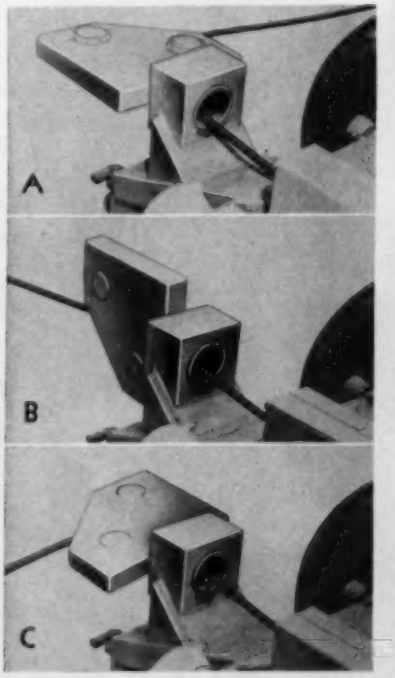
Each drive wheel is suspended on ball and socket type bearings with drive motor, reduction gear train, drive gear, and wheel built as a single unit. Tires are 56-inch standard aircraft type tires. Wheels are interchangeable and can be easily removed after socket caps are taken off and wires to the motor are disconnected. The steering motors are located at the front and rear of the unit and are individually controlled from the cockpit by means of finger-tip switches. Limit switches automatically cut off the steering motors when the wheels have reached their limit of turn. The winch is separately controlled by a fingertip switch on the control panel. The Timken bearing, self-aligning, LeTourneau patented fairlead bracket in the rear of the machine's frame structure permits pulls through an 180 degree arc with a maximum side pull of 90 degrees from the axis of the machine. The A. C. motor and reduction gear box can deliver 30,000 lbs. line pull through the ¾-inch cable and line speeds of 60 ft. per minute. The automatic brake on the winch motor will hold the load instantly when the operator releases the control switch. A 50 ft. air hose on a spring reel attached to the underside of the operator's cockpit is included in the accessories for the purpose of servicing oleo struts, tires, and any other items requiring compressed air. A 12 cubic foot compressor driven by the Tournatow's diesel engine supplies the compressed air. A compressed air storage tank is mounted at the front of the machine.

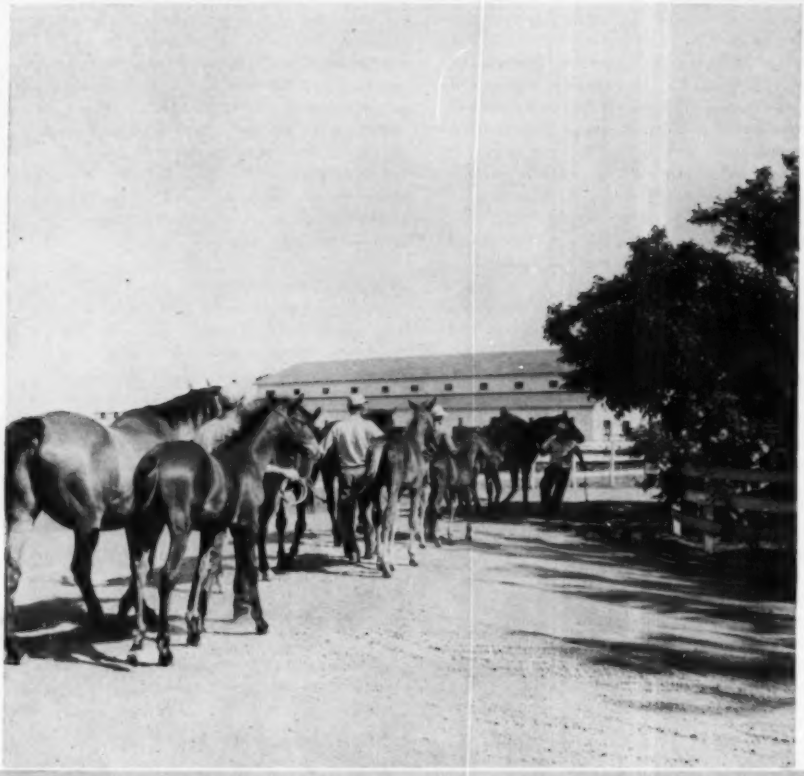
By virtue of the combined A. C. and D. C. systems, the unit can be used at will as an auxiliary (standby) power plant. Welding equipment, lighting equipment and other electrical units can be easily handled by the large capacity in-line generators. The machine can carry five men in addition to the operator and can be equipped with a cab for winter operation. The cab is designed for quick removal being held in position by four cap-screws. Built low with a low center of gravity it can work around and under aircraft. From a standing position, the operator can see all four wheels, the front and rear clevis and the pin structure, making for fast, easy maneuvering into the towing position. The absence of "steps" or fixed speed ratios in the potentiometer control means that a steady smooth flow of power can be applied while the load is being accelerated. Because there is no mechanical linkage, there are no intervals of clutch operation or reduction in engine speed to change gears.



CUT-AWAY DRAWING OF ELECTRIC WHEEL

The self-aligning LeTourneau fairlead bracket mounted on the rear of the frame structure.

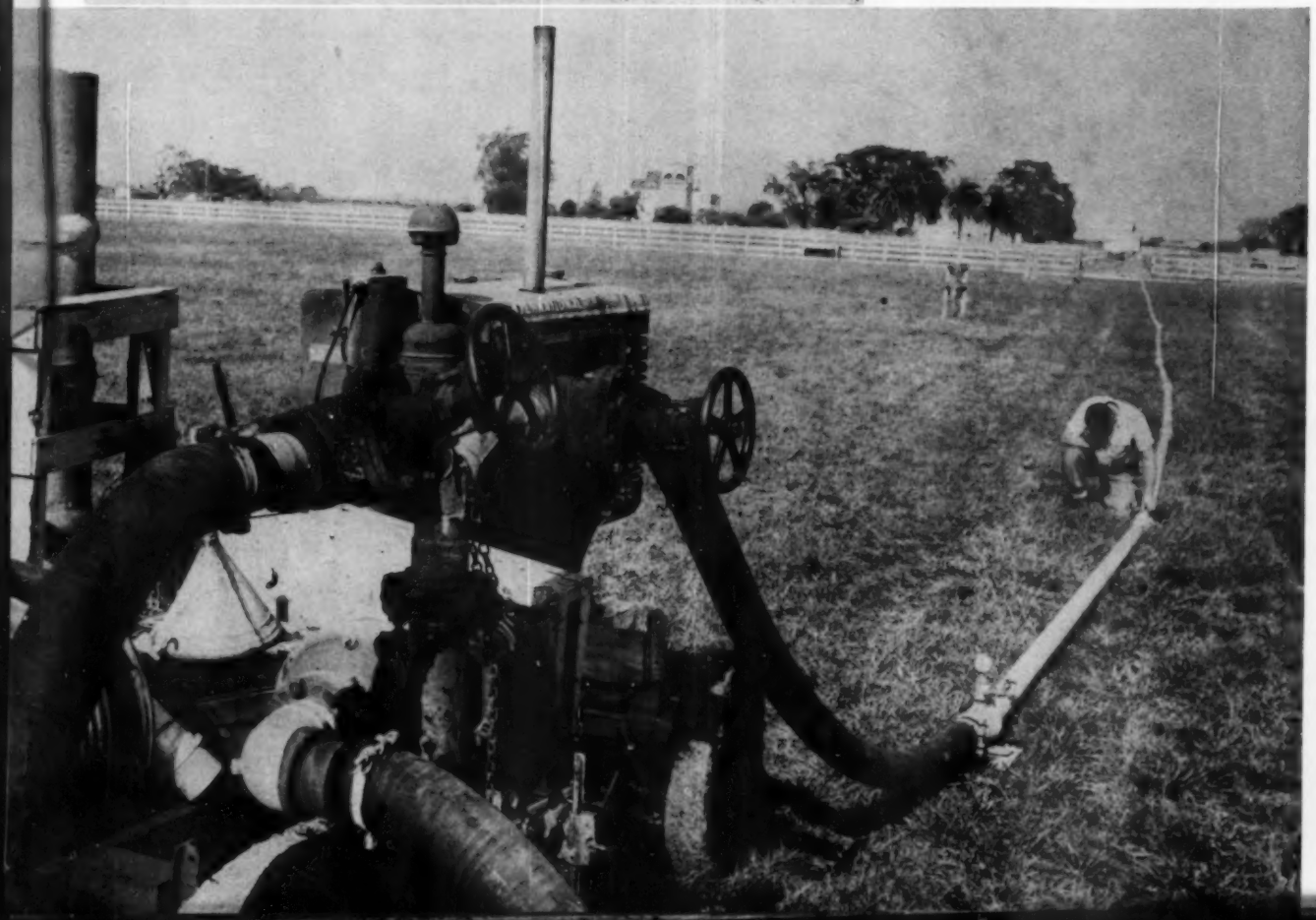


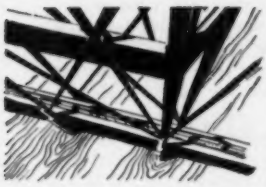


OAK MEAD FARM

COMMONLY, diesels have nothing to do with race horses. Indeed, we almost hesitate to suggest such a combination. If you are a diesel man, not addicted to following the "bangtails," you are likely to feel that your favorite subject has been not treated seriously. On the other hand, if your favorite pastime is watching the ponies, it would never occur to you that a diesel would have any connection with a self-respecting horse. However, even race horses like to eat. And, in the arid West there is at least one place where diesel power provides succulent green pasture for a herd of race horses.

Oak Mead Farm near San Jose, California, uses an International UD-6 diesel, developing horsepower to drive a Model 4B Pacific pump for overhead pasture irrigation. The engine and pump are mounted in a portable rig designed by John Semas, farm superintendent. Concrete tile, buried under the surface, carries the water to outlets conveniently located in the pastures. Race horse breeding stock and foals are pastured on the 160 acres of native grass mixtures irrigated by the engine. Mrs. Dorothy Cohen, of San Francisco, owner of Oak Mead Farm, has bred a number of outstanding race horses, such as War Spur, winner of the California Derby, and War Glory, son of Man O' War.





76% Increase in revenue– 50% Saving in locomotive expense

THE Wabash Railroad's new GM Diesel-powered "Blue Bird," put in service February 26, makes a complete round trip between St. Louis and Chicago every day. This Dome-car Streamliner replaced two trains making a single trip in each direction.

Here are the accomplishments of the "Blue Bird" in its first six months of operation:

Increased passenger revenue per train mile *76%*
Reduced fuel cost *51%*
Reduced locomotive repair cost per mile .. *47%*
Increased utilization of equipment *100%*

Facts like these explain why General Motors locomotives save enough in a few years' time not only to pay their cost, but also to purchase other new equipment needed by the railroads for better service in peace or war.

Strong, solvent railroads in the hands of competitive industry are essential to America's prosperity and growth. Sixteen years of main-line experience proves that dieselization with General Motors locomotives is the soundest investment railroads can make.

GM
GENERAL MOTORS
LOCOMOTIVES

A Green Light for Economy in Railroad Operation

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS • LA GRANGE, ILLINOIS

Home of the Diesel Locomotive

IN CANADA: *General Motors Diesel, Ltd. London, Ontario*

DIESEL SHIP "JOAN MAHER"

TWO of the most recent towboats built by St. Louis Shipbuilding and Steel Co., the single screw *Joan Maher* and the *L. L. Wright*, are designed to meet the particular and rather difficult conditions encountered in towing from Houston, Texas to Chicago, Illinois. These sisterships, while not the most powerful, are certainly two of the most versatile operating on the Mississippi River system. From the stern designed for towing on a line in the Intercoastal Canal, a pilothouse of the raising and lowering type as required for operating in the Chicago area, to the high speed Kort Nozzle and Contraguide rudder, these were boats designed and built to meet the operators' requirements for the fast transportation of petroleum products.

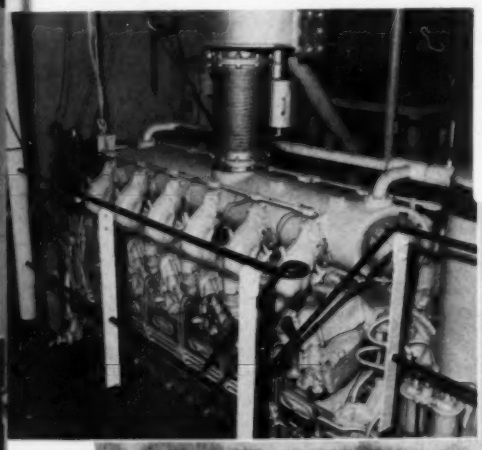
The *Joan Maher* was built for Russell Maher of Chicago, Illinois, and although not tested with loaded barges under actual operating conditions with and without the Kort Nozzle, as was the *L. L. Wright*, has turned in an excellent performance record to date. Tests on the *Wright* after installation of the Nozzle and Contraguide rudder showed a 32 per cent gain in performance at a pool speed of 10 miles an hour. With a hull 100 feet long, a beam of 26 feet, and depth of 9 feet, with a loaded draft of 7 feet 0 inches, the *Joan Maher* has a model bow with easy flowing water lines, and these easy lines continue back to the stern where a high speed Kort Nozzle is installed. The hull is of heavy, rugged construction with a minimum of 3/8-inch plate being used on the shell and bulkheads. The bilge plate is 1/2 inch and heavier plating is used around the propeller. All bulkheads are stiffened both vertically and horizontally.

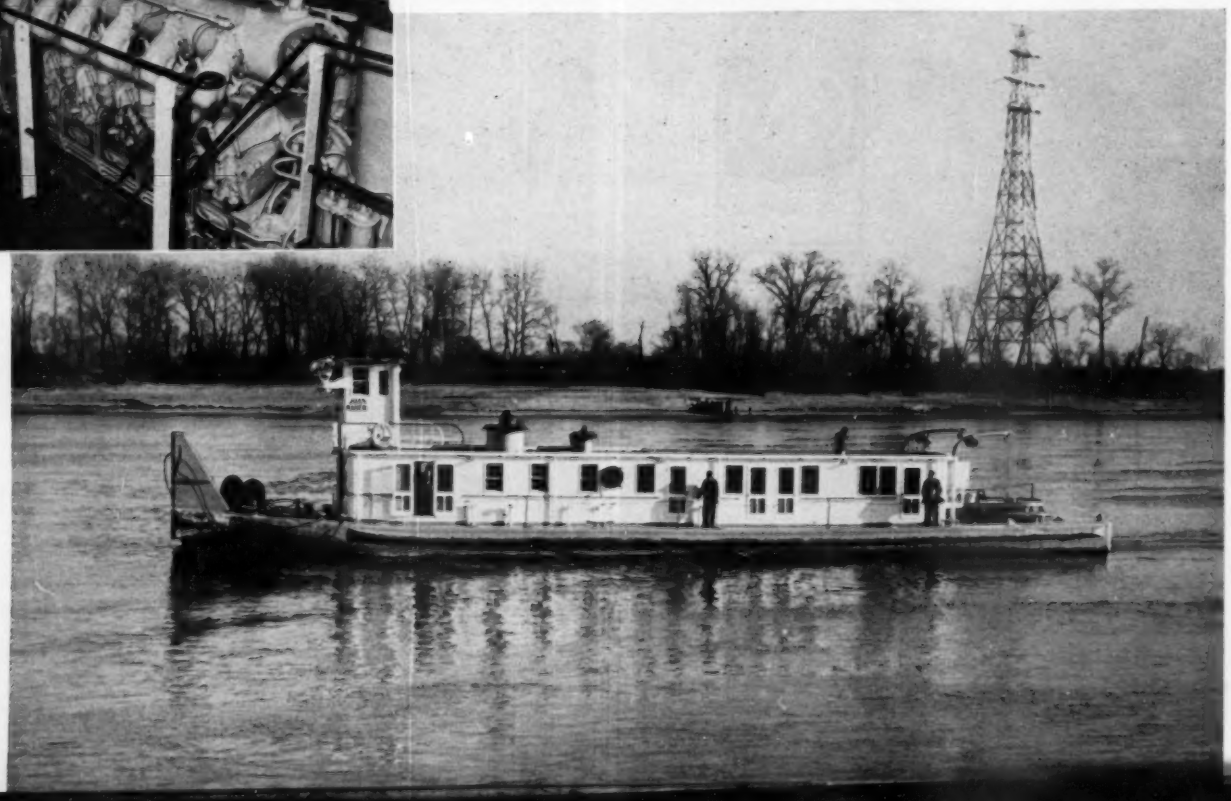
The fuel for the diesel engines is carried in hull compartments which have a capacity of 21 days' fuel supply. Wash water is also carried in hull compartments, and the potable water is carried in separate tanks. The deckhouse is of steel construction with Truscon steel sash and steel outside doors. All exterior walls are installed with 2 inches of Fiberglas, and the lining and partitions are of 1/4-inch tempered Masonite. As previously mentioned, the pilothouse is of the raising and lowering type. This is accomplished by mounting it on a 12-inch hydraulic ram. Quarters are provided for a crew of 10 and a guest room, and because of the low vertical clearance required to operate under the Chicago bridges, all the quarters are on the main deck. The galley is equipped with an electric refrigerator and an 18 cu.ft. deep freeze cabinet. The oil burning galley range is a Shipmate. The sink has a double drain, stainless steel top, and meets the U. S. Public Health Service requirements.

The *Joan Maher* is powered with a General Motors (Cleveland Division) Model 12-278A diesel engine, fitted with a Falk 3 to 1 ratio reverse-reduction gear and Airflex clutches. The engine develops 1,200 hp. at 750 rpm., and with the 3 to 1-gear, turns a 4-blade propeller at 250 rpm. The controls for the engine and for the Airflex clutches are controlled directly from the pilothouse. The main engine and auxiliary engine are cooled by a St. Louis Ship built-in skin cooling system, and the lube oil coolers are of a size to cool the oil using the water from the enclosed cooling system. Engine cooling is controlled by an automatic temperature regulating valve. The only pump connected to the sea chests for using river water is the fire pump.

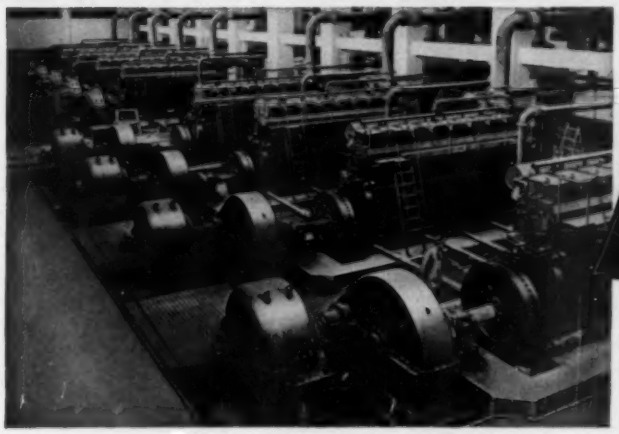
A Contraguide steering rudder improves the boat's propulsive efficiency and also assures it of good steering power. Two backing rudders are also provided with separate steering gears provided for the steering and backing rudders. The two steering gears are of the St. Louis Ship electro-hydraulic type with electric follow-up. The propeller shafting is of steel, fitted with sleeves at the stern tube and stern strut bearings, and the 4-blade propeller is of cast steel. The stern tube bearing is oil lubricated and the stern strut bearing is a Goodrich Cutless rubber bearing. Two 5-hp. motor-driven air compressors provide the air, at 400 pounds pressure, for starting the engines, and, through pressure reducing valves, also provide air for the Airflex clutches. The electric power is provided by a 15-kw. 125-volt d.c. tailshaft driven generator, and a 30-kw. 125-volt d.c. diesel engine driven generator, and an Exide 112-volt marine battery floats on the line.

With the combination of "easy" lines, a slow speed propeller, Kort nozzle and Contraguide rudder. The *M/V Joan Maher* represents the very latest in modern towboat design, and is proving herself to be one of the best towboats of her power on the rivers today.





EXCEPTIONAL LOW POWER COST for huge new Los Angeles sewage disposal plant



Worthington Supercharged Dual Fuel Engines to Supply 15,000 hp . . . for only the cost of pilot fuel!

Nine Supercharged, Dual Fuel Worthington Engines, of 1688 hp each, installed at the new Hyperion Sewage Treatment Plant, Los Angeles, California

Now being built at a cost of approximately $41 million, Los Angeles' new Hyperion sewage disposal plant will be the most modern and efficient in the world. Designed to handle an average daily flow of 245 million gallons of raw sewage, this modern "high-rate" plant will feature the most advanced engineering in every detail of operation.

Nine Worthington Dual Fuel engines are to be the entire power source. Five will drive generators, and the other four will drive blowers. The Hyperion plant will operate at exceptionally low cost, thanks to: (1) the Worthington-pioneered dual fuel principle, permitting the use of gas, oil, or gas and oil in any ratio; (2) supercharging, which provides maximum power for available space, and with the utilization of high-temperature water cooling and exhaust heat recovery system, results in highest thermal efficiency.

SEWAGE GAS THE FUEL

These Worthington engines will normally run on raw sewage gas, utilizing pilot oil to ignite the gas. *Fuel expenses under ordinary conditions, therefore, will be only the cost of pilot oil.* However, should there ever be a shortage of sewage gas, the engines will automatically shift to oil fuel, in the necessary ratio. This gas-oil ratio can also be controlled manually.

FOR EVERY SIZE OF PLANT

In addition to Dual Fuel Engines, Worthington makes a wide range of Diesels, pumps, comminutors, and other equipment, to meet the requirements of sewage treatment plants of every size from the smallest to the largest. For further facts on the trouble-free, cost-saving engine performance that proves *there's more worth in Worthington*, write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y.*

WORTHINGTON

YOUR PARTNER IN POWER PROGRESS
WORTHINGTON-BUILT AUXILIARIES
Diesel engines, 190 to 3,520 hp . . . gas engines, 175 to 3,520 hp . . . dual fuel engines, 225 to 3,250 hp.
Balanced Angle Compressors
Oil Transfer Pumps
Cooling Water Circulating Pumps
• Evaporative Type Engine Water Cooler

High-Speed Diesels . . . Design, Operation & Maintenance

CONDUCTED BY H. G. SMITH

CYLINDER SLEEVES

MOST all of the High Speed Diesel Engines in production today have wet or dry type cylinder sleeves as standard equipment. Although the two types are used to accomplish the same results, their design and construction vary slightly in some details.

One of the basic reasons for using a sleeve is to provide a design whereby the material in the cylinder can be definitely controlled in its structure. This control means that a harder and more uniform surface can be obtained than that which is possible when the cylinders are part of the entire cylinder block casting. Another reason for their use is the replacement factor.

The two types differ in that a dry sleeve is an insert inserted in a bored out cylinder block. The block has walls for each cylinder which prevents the cooling water from touching the inserts which explains why the sleeve is called a "dry" type. Wet sleeves are inserts that make the complete cylinder wall and the external surface is in direct contact with the cooling water. Both types of sleeves have their advantages as well as disadvantages, but the advantages, whether wet or dry, far outshadow any argument that might be presented against them.

The use of sleeves antedates the High Speed era. They originally appeared in gasoline engines that were used in the farm tractor. In the earlier days of farm tractors the air cleaners and the oiling systems were not what they are today. Air cleaners, especially, were inadequate for the dust and dirt of the tractor operation and pistons and cylinders would wear so badly that they would be worn out in as little time as ten days to two weeks. The writer has personally seen pistons removed in this short time that looked more like barrels, small at the top and bottom as much as sixty thousandths. This condition was so serious that it was quite difficult to sell a farm tractor that did not have quick replaceable sleeves.

Sleeves in those days were as much a part of an engine as a piston; however, as noted, they were not used for the same reason that they are used today. Then it was a case of quick replacement; today it is more for better quality of material and longer life.

Originally the dry sleeve was used more by the engine rebuilding trade than the original equipment people. By using sleeves the engine could be brought back to its original size and avoid the excessively thin cylinder walls that were experienced by just boring out the cylinder and using oversize pistons.

Diesel engines that have certain constructional details which prevent the use of wet sleeves are equippd with the dry type. These sleeves with their harder material give excellent cylinder life even though the diesel has higher cylinder pressures than gasoline engines. The diesel engine designers that use wet sleeves feel that their design is better than the dry sleeve because the wet sleeve provides a controllable wall thickness that is not affected by cylinder casting problems. The dry sleeve engineers argue that the space required for a wet sleeve is greater than the dry type, consequently the engines are longer and heavier. Some companies build both types so such discussions can be passed as only arguments and have nothing to do with the basic advantages of cylinder sleeves.

The main point that is interesting to the user of High Speed diesel engines is, "What are the real advantages and why are they used." To answer this point it is necesary to go into the subjects of cost and foundry problems. To obtain higher hardness of cast iron it is necessary to use some types of alloys such as chromium or molybdenum or both. These alloys are very expensive and must be used as sparingly as possible to keep down the engine cost. If it were possible to pour these alloys in the basic iron that goes into the cylinder barrels and just plain iron into the remainder of the cylinder block, one part of the problem would be solved, but such a procedure is next to impossible. Putting these alloys in all of the four to six hundred pounds of cast iron used in the entire cylinder casting is a waste of money.

In addition to this problem of alloys, there is a more difficult one that is nearly impossible to control. When cast iron cools it cools faster in thin sections than it does in thick sections, and, unfortunately these alloys cause these thin sections to become extremely hard, and the thicker sections somewhat softer. Cylinder barrel thickness in a complete casting cannot be held absolutely uniform, which means that some spots will be softer than others.

By making the cylinder separate, as is done by the use of sleeves, these parts being a small part of the entire cylinder, can be made with the expensive iron alloys and a uniform thickness and harder structure is obtained. They can be readily heat treated for greater hardness and easily coated with even a harder material such as solid chromium. This extra hardness feature alone is of so great importance in extending the life of a cylinder that the replaceable angle becomes somewhat of secondary importance.

Operating costs include such things as: interest on the original investment; operating labor; replacement parts; replacement labor; hours of use, etc. The cylinder sleeve plays an important part in many of these categories. It cuts down the original cost, is cheaper to replace than a whole cylinder, can be installed very quickly, cuts down the "down time," and above all, lengthens the time between major overhauls.

One point not frequently mentioned in favor of the separate cylinder sleeves, is that by its use the original size of an engine can be held and not affect the compression ratio. If replaceable sleeves were not available the cylinder block would have to be bored out, when it is worn, several times to extend the life of the engine. Every time it is bored out the cylinders are increased in size and the compression ratio of the engine is raised proportionately. Higher compression means higher firing pressures and in turn higher loads on the connecting rods and main bearings. The total increase may not be very much, probably four per cent, but whatever it is this extra load means greater wear.

Many operators do follow the practice of reboring their replaceable sleeves several times and use them over and over again, but these rebores very seldom reach an oversize much more than sixty thousandths and this amount will not raise the compresion much more than two per cent which is in a safe range.

The ease with which a part can be replaced is of paramount importance to all engine users and when the engine designer makes this possible and at the same time improves the quality of the part, a two-point contribution is made to lower operating cost. This is what has been accomplished by use of separate cylinder sleeves.

5th NORDBERG DIESEL

for Rensselaer Indiana...

1924 FIRST Nordberg Diesel installed . . . a 5-cylinder, 550 H.P. unit. Original steam engine kept available for stand-by service.

1928 SECOND Nordberg installed . . . an 875 H.P. unit driving a 600 K.W. generator. Steam plant abandoned.

1932 THIRD Nordberg installed . . . developing 1425 H.P. and 1000 K.W. New building erected and old plant razed.

1940 FOURTH Nordberg installed . . . a 6-cylinder, 1500 H.P. unit, bringing the plant capacity up to 4350 H.P.

1950 FIFTH Nordberg Diesel installed . . . a 7-cylinder, 21½" x 29", 2800 H.P. unit, driving a 2400/4160 volt, 1980 K.W. generator. Total plant capacity now 7150 H.P.

P1050

OUTLINED here are highlights of the development of the municipal power plant at Rensselaer, Indiana . . . a plant started in 1898 with a 60 H.P. steam engine belted to a 1,000 volt generator, and progressing through 53 years until a total of five Nordberg Diesels were installed to handle the ever increasing load.

The fifth Nordberg now carries a large part of the plant load, operating from 14 to 16 hours each day until the load drops to where smaller units can handle it more economically. Comparing present day output of this new Diesel with that of the plant when Diesels were first installed, we find that in two months the new 2800 H.P. unit generates an amount about equal with the entire annual output in 1925. In one month, this unit generated 475,500 K.W. hours at the rate of 13 K.W. per gallon of fuel, carrying an average load of 54%. Lighting rates at Rensselaer have been among the lowest in Indiana . . . thanks to dependable, low cost Nordberg power.

Here again is a typical example of the way in which Nordberg Diesels provide the economical answer to municipal and industrial power problems. Write for details on a Nordberg engine to meet your requirements—in sizes from 10 to 9600 H.P.

NORDBERG MFG. CO., Milwaukee 7, Wis.

USCH-SULZER
A DIVISION OF NORDBERG

NORDBERG
DIESEL ENGINES

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr Ferguson continues to do independent consulting work.

ENGINE NOISE ABATEMENT

AS ENGINE rotation speeds continue to increase so, inevitably do the noises which accompany them unless special measures are taken. The salesmen will extol the virtues of the compact power-pack pointing out the small floor area required, its lightness and easy transportability. The point he does not emphasize is noise, and unfortunately only too often the purchaser, inexperienced in such matters, is faced with complaints from his operating staff or his neighbors which he is at a loss to cope with. Designers do, of course, give some consideration to the problem, and much research has been devoted to the reduction of noise from valve gear and so on, yet the fact remains that the industrial-type engine operating at 1,000 rpm. or more, particularly if fitted with a blower, makes sufficient noise as to constitute a nuisance when installed in a confined space. The general attitude seems to be that the operator will soon get used to it but such an attitude savors of running away from the problem. Noise can also be a very real nuisance in marine work, particularly in the smaller vessels. The writer has often heard complaints from the skippers of diesel driven tugs that orders to the crew and bargemen cannot be heard when the engine room fan-lights are open in hot weather. In passenger vessels the noise level may be the deciding factor between gaining or losing traffic when rival concerns are operating on the same routes.

Until the advent of the Highland Railway the main link between the industrial south of Scotland with the West Highlands was by water, for the few roads were unsuitable for heavy haulage. Today the sea route is still exclusively the link between the mainland and the Western Isles, and during the year a considerable traffic of freight, regular passengers and tourists is carried. The largest fleet operating on these routes is owned by David MacBrayne, Ltd., of Glasgow. In 1930 two new motor vessels, *Lochearn* and *Lochmor* were built for the company by Ardrossan Dockyard, Ltd., and these provided a new standard of comfort for passengers traveling to the Inner and Outer Hebredes. In 1946 both vessels were reconditioned and re-engined. The new engines fitted were standard Paxman Mark 12-cylinder v-type, 7-in. bore by 7¼-in. stroke, with a continuous rating of 330 bph. at 1,000 rpm. driving to the existing handed twin propellers through S.L.M. type 3.33 to 1 oil-operated reverse reduction gear boxes. These main engines are a post-war development of the well-known T.P. type Paxman V-12 engines of which some thousands were built during the war for the propulsion of tank craft et cetera.

It was obvious to the engine builders that special steps should be taken to reduce engine noise if the passengers' comfort were to be secured, and with this in view acoustic hoods were designed which completely shrouded each engine. The hoods are locked in position against movement caused by pitching and rolling yet they can be readily unfastened and are then withdrawn forward into a space provided in the engine room where they can again be locked to the bulk-head.

All the usual instruments such as thermometers, pressure gauges and tachometer are of the distance recording type and are mounted on a panel at the after end of the engine where the manual operating controls are also situated. When in service the hoods remain in place over the engines and all appreciable noise is eliminated. In the confined space of the small engine compartment conversation can be carried on in normal tones.

***Lochearn* at anchor in the shadow of the Cullin Hills, Isle of Skye.**

It might seem worthwhile for designers to consider the more extensive use of totally-enclosing hoods for the higher speed engines. The initial cost would not be very great and in addition to noise reduction there are other advantages to be gained.

It has become the accepted practice with the majority of engine builders to study appearance insofar as piping layouts are concerned. Pipes must be truly vertical or horizontal to follow the line of the engine casing and so on, and bends are commonly made in the form of sharp right-angles for neatness. With the engine hidden from sight these unnecessary refinements can be forgotten. Steel pipes can in many instances replace copper at considerable saving, pipe runs can be designed for efficiency and pressure losses can be reduced by allowing easier bends. Again, if flow can be improved by providing a small rise or fall in a pipe line this can be done without offense to the eye. No car driver cares about the appearance of the engine under the bonnet providing it is clean and accessible, for he seldom needs to look at it for more than a few moments at a time. So why not extend the principle of total enclosure to the larger sized engine?

The two Paxman main diesels in *Lochearn* with sound-insulating covers in place.

One Control..... One Responsibility

THE final result of this youngster's activity is entirely dependent upon his ability. He stands or falls on his own. That's the way we here at Erie Forge approach your problem - - we take it over completely - - One Control - - One Responsibility. Every step - - from raw material to finished crank is accomplished here. Design, metallurgical control, casting, heat treating, forging and machining are under the constant watchful supervision of fine craftsmen with many years of experience.

Consult with us on your next requirements for crankshafts, connecting rods or allied items.

ERIE FORGE COMPANY, ERIE, PA.

Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

SOMETHING FOR US TO THINK ABOUT

TODAY, through the medium of a Presidential Proclamation, this great country of ours is in a state of national emergency. We all realize that that chaotic condition of world affairs has brought this about and that this step was entirely necessary to the well being of us all. Since this has occurred, many of us have been mulling over in our minds just how this status is going to affect us. With national controls, allocations and limitations to say nothing of required priorities which will eventually come on many of the vital materials which we use in the daily operation of our plants, we are again faced with a trying situation.

We must make no mistake and must realize that we of the engineering profession will be confronted with many problems, which will require accurate decisions, problems and answers which we cannot afford to take lightly to heart. We are not alone in this situation. Every member of the engineering profession, no matter what his field, is faced with similar problems, and the extent of his problems depends on his position in the engineering field and the responsibilities of that position. We must realize these responsibilities and that whole-hearted cooperation among members of the profession will be a *must* if we are to attain our ends as a free nation.

In the present dilemma our greatest asset is our ability to produce needed goods and equipment so vital to our own and our allies' needs, and our willingness to carry on this productive program in the shortest possible time. Our national government has called upon all industry for speeded-up and all-out production. Now, where do we fit into this picture? Possibly the greatest requisite of industry, outside of materials, in carrying out this program is the need for electrical energy in ample amounts with a continuity of service. It is a fact that power and energy produced by diesel plants throughout the nation is a very small proportion of the total generation of power of the nation, yet we do play a very important part in the picture.

The tendency of industry since world war two has been to build plants in isolated areas where power and water are plentiful and where labor costs are not as high as in the large industrial centers, and where unskilled labor is available which can be trained to become skilled labor. Most of us know of many such industrial institutions operating isolated plants and making small integral parts, necessary to the operation of a major piece of equipment, as assembled in a larger plant. This isolated plant may be one in your community and dependent upon your plant for the energy needed in its production. Therefore your plant does become a great factor in the production program.

We who are responsible for the plants operation are responsible for furnishing ample energy and continuous service. What are some of the factors involved in assuring our industries this type of service? Probably one of the most important of these factors is the problem of Maintenance. We have all read article after article on this subject and feel that we know all the answers. But I wonder how many of our readers have ever taken the time to get right down to the fundamentals of this problem and tried to figure out how a good maintenance program should be carried out.

This enterprising engineer has taken time to look at this problem from all angles, and realizes that a good maintenance program consists of many factors. It means in the first place, keeping all plant equipment from the smallest to the largest item, in first class operating condition. To accomplish this an engineer must have a thorough knowledge of the working and mechanical parts of all his equipment and the function of each integral part in the performance of the plant as a whole. It means further that he must have an accurate knowledge of the limitations of those parts, the proper lubricants to use in daily operation and a first class knowledge of the actual condition of the power plant equipment. This information can only be acquired by proper inspection and records, all of which require time and effort on the part of those responsible for plant operation and maintenance. However, this is only the beginning. Maintenance cannot be carried on unless you are properly equipped with tools and materials to do the job in the shortest possible outage time. Mechanics may be ever so good at the actual repair job, but if they are forced to look hither and yon for tools and materials after a job is once started, much valuable time will be wasted. Many capable mechanics do not realize that their value can be greatly enhanced by having tools and equipment as well as materials available to do the job efficiently in a minimum of time.

Another factor in maintenance is that of replacement and repair parts. A supervisor should be far sighted enough to be able to ascertain his needs far in advance. To help him in this decision, a suitable stock room to house such parts, with a well-kept perpetual inventory, is a *must*. This stock room should contain materials in such quantity and of such assortment as to be immediately available at all times for emergency use. However, hoarding should be absolutely avoided. We should carry an inventory of needed parts not in excess of our actual needs, otherwise we are tying up money in inventories and might be stocking unneeded materials which a fellow supervisor has been unable to secure. It is a known fact that we have a certain element in this country who would, if it were not for the government controls, allotments and limitations on vital materials, hoard these materials and hold them for black market prices. We experienced a certain degree of that in world war two. The scarcity of these materials under government controls is a problem that every engineer must face and face willingly, but it does create a situation which in the long run will cause prices of replacement parts to rise—the result of the law of supply and demand. This will mean higher maintenance costs and there isn't a great deal we can do about it. But to have a black market condition added to a situation already caused by scarcity of materials is certainly un-American and should be discouraged to the utmost. Therefore, we can help avoid this by holding our inventories within reason, and stock only enough parts to insure the factor of safety. This will give the other fellow an opportunity to do the same.

Such a procedure on our part will necessarily mean more work for every one but we are going to have to assume these responsibilities all along the line if this program is to be made workable. We are going to have to use all our ingenuity in making substitutes for some of the items which were formerly easy to obtain. We are going to have to devise ways and means of repairing worn parts which were formerly discarded and replaced. Right here I am reminded of an incident which occurred in world war two which will illustrate my point.

In a certain plant the supervisor discovered while making an inspection that a piece of equipment

. . . and now please turn to page 62 . . .

BINKS evaporative closed-type
HEAT EXCHANGE COILS

Binks Type "D" coils are ruggedly built of heavy 1-inch O.D. copper tubes. 3-pass arrangement increases velocity of fluid through tubes, giving greater cooling efficiency.

for EXACT CONTROL of Diesel cooling water temperatures

Exact control of the operating temperature in Diesel engine jackets is readily accomplished with Binks Type "D" evaporative heat exchange coils, installed in a Binks natural or mechanical draft cooling tower. Raw cooling water, sprayed over the coils, cools by both evaporation and convection. Correct temperatures are maintained by regulation of either the cooling spray or the flow of jacket water in the coils. Jacket scale is eliminated...engine efficiency is increased...breakdowns and insurance rates are reduced.

SEND TODAY for Bulletin No. 41
Complete engineering data. Tells how Binks Type "D" heat exchange coils increase Diesel performance.

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IN THESE DAYS OF FAST MOVING PREPAREDNESS PROGRAMS AND ACCELERATED INDUSTRIAL PACES?

IT IS THE PURPOSE OF OUR BUSINESS TO RELIEVE YOU OF YOUR POWER PLANT MAINTENANCE AND REPAIR PROBLEMS, whether they be routine inspection and maintenance, minor repairs, modifications or complete rebuilding.

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MANUFACTURING and REPAIRING of heavy castings, crankshafts, bearings, connecting rods, pistons, liners, cylinder heads, valves, etc.

Obsolete parts and items no longer stocked by the engine builder need not keep your power plant equipment out of service.

Our complete line of especially engineered and developed portable machines and "On The Job" equipment may save you valuable time and expense.

CALL, WIRE or WRITE for further information.

"KEEPING PACE WITH DIESEL PROGRESS"
WASHINGTON IRON WORKS, INC.
Established 1876
SHERMAN, TEXAS

Bendix-Skinner
ORIGINATOR OF **MICRONIC** FILTRATION

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For over twenty years ***Bendix-Skinner*** has specialized in solving the filtering problems that "couldn't be done." From this experience has come entirely new and exclusive filtering techniques which do even the work-a-day filtering jobs better and at lower long-range cost. Tell us about your problem—nine times out of ten ***Bendix-Skinner*** filters will supply the "finest" answer.

***Over 350 Models** providing filtration from 1/2 micron (.000019") upwards at flow rates from 1 to 5000 g.p.m.*

SKINNER PURIFIERS DIVISION OF
1503 TROMBLY AVENUE
DETROIT 11, MICHIGAN
Bendix

Something for Us to Think About

. . . continued from Page 60 . . .

constructed entirely of bronze was becoming defective. He contacted the manufacturer to ascertain whether a replacement part was available. He learned that it was not and that he would have to order it on a priority basis and it would be ten months or more before the part would be available. In order to keep the unit in operation he knew that this particular piece of equipment would have to be repaired long before that time so he suggested to the manufacturer the idea of endeavoring to brace on material in the worn place and re-machine an old piece which had been removed formerly. He was informed that such a procedure was an absolute impossibility and waste of time and material—it could not be done! This supervisor had an excellent welder in his crew, so they got out the discarded item and looked it all over and finally decided that they would attempt the repair. They put in long hours of studying after work and eventually decided how it could be done. Within three weeks they had rebuilt the bronze casting, machined it down and had a workable part which, incidentally, lasted for several years. It probably wasn't just as efficient as an entirely new casting, but it did the job and the manufacturer was very surprised that such a repair had been made on an important item which his engineers professed was an impossibility to repair. And the unit was kept operating.

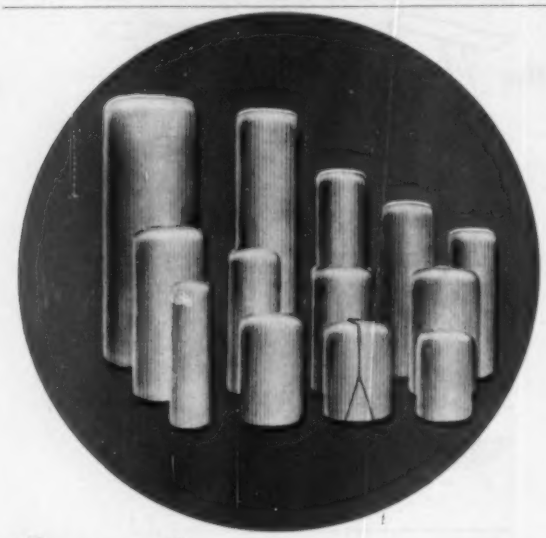
Another problem we are bound to face is that of longer hours of overtime work to keep our units in tip-top operating condition. The all-out production program is going to place heavier load demands on our plants, and some of us may find that we are going to have to carry on our maintenance work on a catch-as-catch-can basis, when units can be spared for maintenance without detriment to plant output.

Another point seldom considered as plant maintenance is that of plant expansion. A good maintenance program considers the idea of having enough reserve capacity installed to allow for outage of at least the largest unit in the plant without affecting plant output. I wonder how many of us ever considered that angle as a point in plant maintenance? We might have thought of it from the operating angle as having reserve capacity, but what about the maintenance angle? A plant expansion program consists of a multitude of problems. Many plants are in the midst of such a program today. Plant expansion isn't confined merely to the securing of additional engine or generating equipment. It also consists of the procurement of such factors as steel, concrete, electrical equipment, transformers, copper for distribution lines, switchgears, building materials, etc. Many of these items are most vital to the all-out production program, some of which are under government controls at the present and most of which eventually will be.

Many of our manufacturers of power plant equipment are already backlogged for as much as three years and as time goes on the securing of additional plant equipment will become increasingly harder. That is why we need such agencies as the National Defense Control Board, so that equipment can be allocated to the proper sources and priorities can be given to the distressed plants. If you are fortunate enough to belong to the APPA you will have access to the control board, since the APPA maintains a committee to handle your requests and help acquire needed materials.

Undoubtedly we will again face the necessity of having priorities to secure replacement parts, such as were in vogue in world war two. From the writer's viewpoint it appears that controls may be even more stringent, especially if the situation develops into all-out war, since we are now bound to supply our allies with many materials on which they are short. As of date the situation has not become too bad, but we should make our maintenance plans correspond with a situation which may become more difficult.

One other item is the problem of fuels and lubricants, and such materials needed in plant operation. Just how long we can depend upon such items maintaining their present standards of quality is more or less problematical. Not that we face any dire condition at present, but who actually can predict future developments over a long period of time? One thing is certain that plant operating and maintenance costs will rise and the best we can hope for is that by our coordinated efforts, increased ingenuity and improved methods we can hold our costs at a minimum. In the meantime it gives us something to think about in doing our part in the all-out productive program we have initiated throughout the country.



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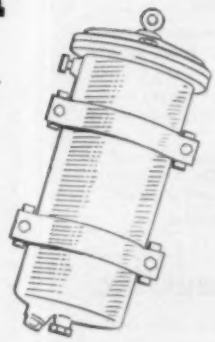

More and more, as the national emergency makes it imperative that you protect your engines against the danger of being unable to replace or repair them, your maintenance program must provide for dependable filtration of fuels and lubricants. The urgency of your need makes it doubly worth your while to remember that Winslow manufactures over 200 sizes and shapes of fine elements. There's a Winslow Element for any make or model of filter that you may own!

WRITE FOR YOUR COPY OF OUR POPULAR BOOKLET, "THE CASE OF THE DIRTY DRIP." IT'S FREE!

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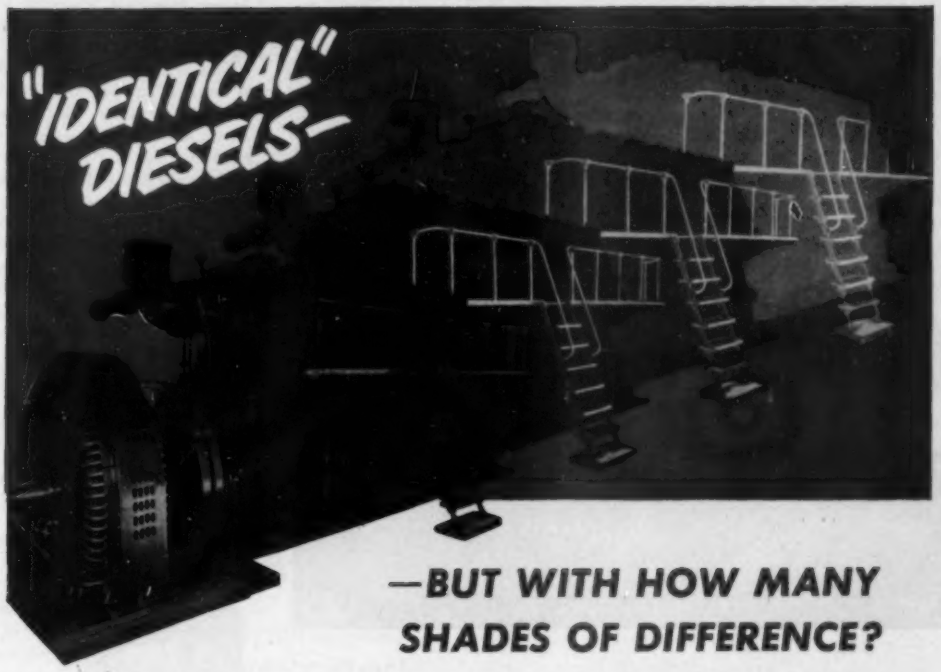

—BUT WITH HOW MANY SHADES OF DIFFERENCE?

When they're delivered to the buyers a number of Diesels may be identical in make and model. But in actual use . . . working in different plants and climates . . . differently loaded, operated and serviced . . . the "identical" Diesels soon differ even more than just a shade. That's one reason the lubrication which seems ideal in one particular case may cause a similar Diesel working elsewhere to run up unnecessary downtime.

You can guard against the adverse effects of such variables . . . against the improper lubrication of your costly Diesels . . . by calling in a Cities Service Diesel Lubrication specialist. He knows all types of Diesels and their lubrication; he knows practical plant procedure, too. That's why the Diesel lubrication schedule he will be glad to develop especially for you can provide far better protection for your Diesels—and for your profit showing. Contact the Cities Service office nearest you, or mail the coupon now for booklet on "Diesel Engine Lubrication."

The Cities Service complete line of top quality petroleum products includes a Diesel lubricant for every operating condition.

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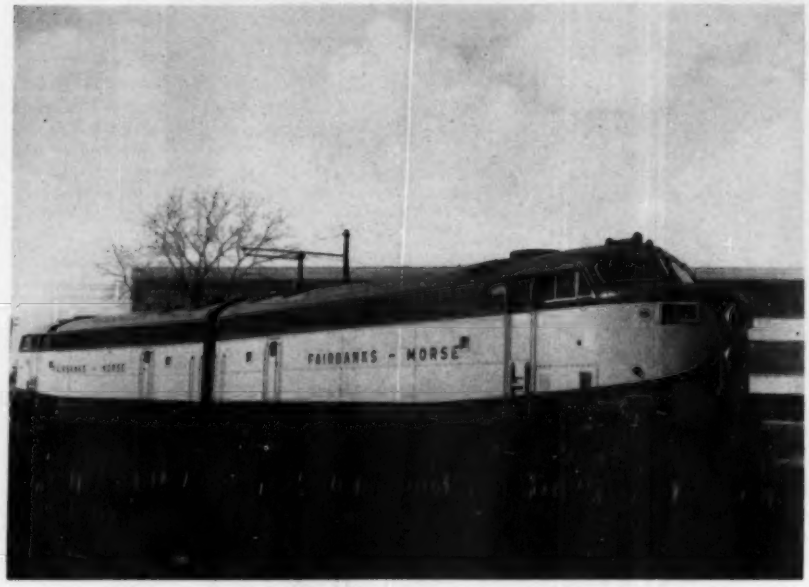
The latest in Diesel Locomotives



Is Protected by NUGENT FILTERS

The newest thing to hit the rails in diesel locomotives is Fairbanks, Morse's new 4,800 H.P. two unit passenger locomotive. This locomotive is the prototype of Fairbanks, Morse's "Consolidation Line" which will be offered in horsepower ratings from 1,600 H.P. to at least 9,600 H.P. in single locomotives. Outstanding features are high horsepower per foot of length and increased weight on drivers despite a reduction in overall weight.

In a locomotive of this type where so much depends on efficient day-in and day-out performance, it is natural that Nugent lube oil filters were selected to help protect the vital working parts of the two 2,400 H.P. engines.

Nugent pressure type filters are your best assurance of clean oil for all types of diesel power. By actual test they get out 99.8% of the dirt. Size for size they offer larger filtering area, and uniform dirt loading provides maximum efficiency and maximum life. Recharges are the inexpensive "Throway" replaceable type.

To get the long, dependable life your diesels were built to give, equip them with Nugent Filters. This is an investment that will come back to you many times over. Available for diesel engines from 1 to 384,000 H.P. in single containers.

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Moves to New Quarters

The Taylor Dynometer & Machine Company, manufacturers of "HI-EFF" precision drilling machines, dynamometers and balancers, has moved Avenue, Milwaukee, Wisconsin. According to A. C. into new quarters located at 528 West Highland Flamme, company executive, the move was made to accommodate increased demands for production of "HI-EFF" equipment. The move had been contemplated for nearly two years as a result of increased orders from industries in which the equipment had been marketed in the past as well as from orders developed from industrial fields which have been becoming more and more aware of the need for precision equipment. Mr. Flamme stated that with its newly increased facilities, his company will be able to double its former output. Adapated to those industrial areas that require precision work on a large scale production basis, 135 models of absorption type dynamometers are available with capacities ranging from .01 hp. to 12,500 hp. "HI-EFF" balancing machines will balance parts ranging from a few ounces to 1,500 pounds. The sensitive drilling machine, while it falls into the specialized tools class because of its great precision, is increasingly in demand among engine builders and others where drilling of small accurate holes is required, according to the manufacturer.

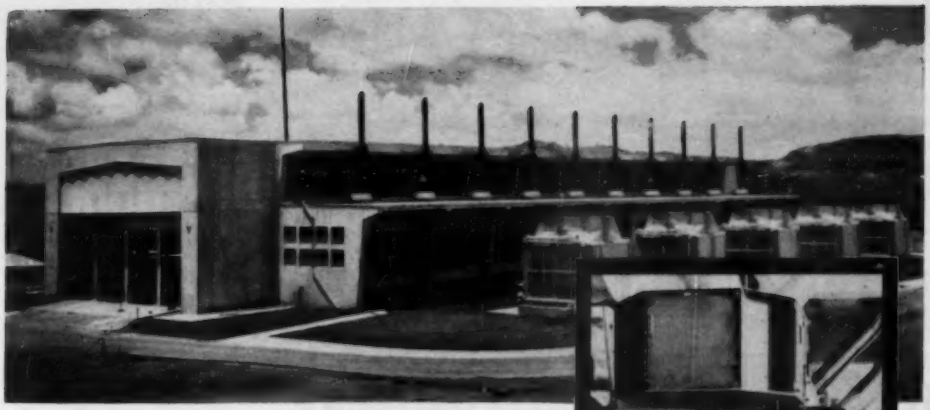
Manager Appointed

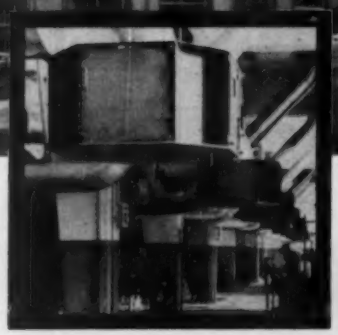
W. A. Neuman, Jr.

Mr. G. W. Smith, Jr., president of the De Laval Steam Turbine Company, announced the appointment of Mr. W. A. Neumann, Jr. as manager of the IMO-De Laval Products Division. In this capacity, Mr. Neumann will be responsible for the engineering and sales of the company's line of power transmission equipment and rotary pumps. He has served as acting manager of this division for the past year. In addition to his new responsibilities, Mr. Neumann will continue as assistant treasurer of the company. He previously held the postion of controller. This latter position will be assumed by Mr. E. W. Clark who has been with the company since 1946 and has been chief general accountant and, for the past year, assistant controller.

Catalog Bulletin Issued

A new catalog, Bulletin No. 892, on its line of Sheepsfoot Tamping Rollers has been released by the Baker Manufacturing Company of Springfield, Illinois, manufacturer of earthmoving equipment. The booklet describes the Baker-designed feet, shaped to compact soil without disturbing it on pullout. The Baker rollers are made in single, double and triple drum models, with tandem hitches available for 3-2-1 or 2-1 operation. Features include spring-cushioned draw-bar, universal clevis, forged tampers, replaceable toes, box section all around with double reinforced corners, shear type cleaners at front and rear, hardened steel bushings, extra heavy axle tieing frame member at center, and dirt and grease sealed self aligning roller bearings.





NAVY *Scuttles Dust* with AAF Filters

Type "OC-H" FILTERS Provide Defense For Twenty Diesel Generators On Guam

Since 1948 the Navy has consolidated its scattered power generation operations on Guam with the installation of two 10-generator stations. Main illustration above shows exterior view of the modern station at Agana. Inset shows interior view of the duplicate installation at Orote and the AAF Type "OC-H" Filters which are installed on the air intake of each 1000 hp Diesel generator.

Dust is the sworn enemy of such equipment and, if given the opportunity, can quickly lead to permanent damage, costly repairs and untimely shutdowns. With AAF Filters standing 24-hour guard, these engines are safe. The type "OC-H" is a low cost, washable, unit-type filter which offers low resistance to air flow, high cleaning efficiency and large dust-holding capacity.

Whether your operations are located in a desert, dust bowl or industrial district, AAF has a filter of a type and capacity that will provide positive dust protection for your engines or compressors. Write today for complete catalog information.

AAF

American Air Filter

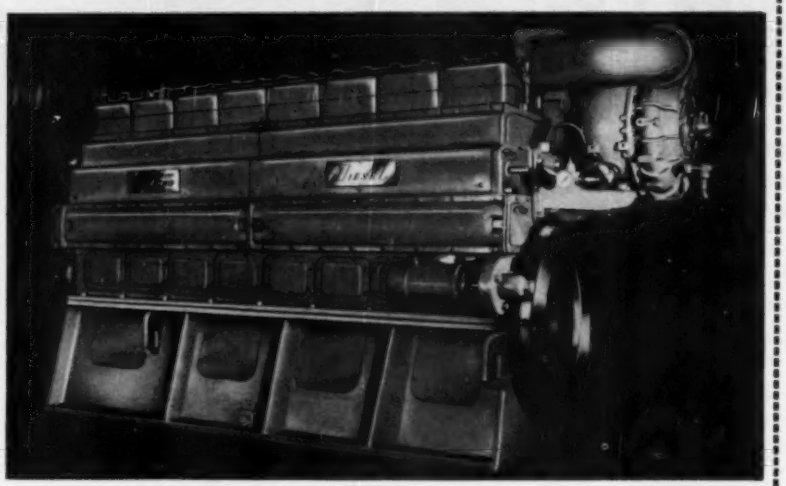
COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky • Darling Bros., Ltd., Montreal, P. Q.

New Seals Marketed

A seal for boiler handhole and tubecap cover assemblies which require no compounds and can frequently be reused has been placed on the market by Flexitallic Gasket Co. of Camden 5, New Jersey. Available in two thicknesses: .125 inches for use with assemblies having narrow seating surfaces and high bonding loads; and .175 in. for use in assemblies having broad seating surfaces and low bonding loads, they come in three ranges of operating pressure for most makes of boilers and auxiliary equipment: 0-499 pounds, 0-999 pounds, 1,000 pounds and above. The gaskets are manufactured of low carbon plated steel with Canadian asbestos filler and type 304 stainless steel with Canadian asbestos filler for all ranges of operating pressure. Low plated carbon steel serves well in a majority of applications where saturated temperatures do not exceed 500°F. The company states that other fillers can be furnished in combination with any ferrous or non-ferrous alloys where the use of such materials is indicated. Known as Flexitallic Style T gaskets, they are also available for non-standard assemblies and can be designed and manufactured to meet specific temperatures and pressures and to resist severe corrosion.

More POWER... Less SPACE
WITH
STERLING VIKING DIESELS



This 8-cylinder turbo-supercharged Viking Diesel is conservatively rated at 750 hp. Sterling Diesels are available in five different models beginning at 100 hp.

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Sterling Viking Diesel engines offer definite advantages in:

Compactness . . . more power in less space. A high ratio of horsepower to weight.

Sturdy construction . . . one piece block and base. All working parts are easily accessible.

Dependability . . . Service records show a high operating efficiency, low maintenance cost. All Sterling Diesels are conservatively rated, built to deliver smooth performance over their full power range.

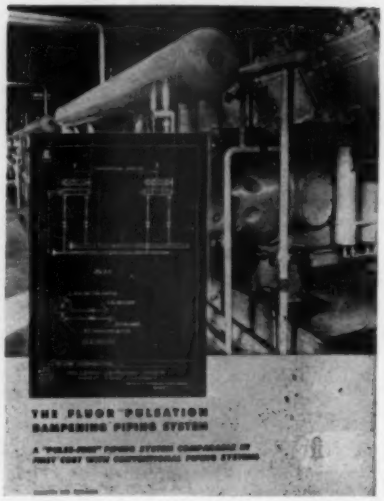
Without cost or obligation, talk over your power requirements with an **experienced** Sterling engineer. We invite your call and the opportunity to bring you up to date on Sterling's accomplishments.

STERLING ENGINE COMPANY

1270 Niagara St. Telephone Lincoln 0382 Buffalo 13, N. Y.

Sterling Viking Diesel Engines from 100 to 750 hp.—Sterling Gasoline & Gas Engines from 100 to 600 hp.

Prefabricated "Pulse-Free" Piping



A new approach to pulsation dampening is described in Bulletin No. PDS-8501 of the Fluor Corporation, Ltd., 2500 South Atlantic Blvd., Los Angeles 22, California. Pulsation is present in varying degrees in all gas systems where reciprocating type compressors are used. The Fluor Pulsation Dampening System is predicated on a system of bottles, laterals and headers to provide the appropriate components of acoustical filters. This does not involve any radical departure in the physical appearance of conventional piping systems except for a reduction in the number of extraneous devices usually required to anchor the system. It is claimed by the manufacturer that compressor efficiency is increased, metering inaccuracies caused by pulsative flow reduced and maintenance problems cut to a minimum with the Fluor System.

Aids in Competitive Selling

Every diesel salesman should have as a part of his working kit a copy of the DIESEL ENGINE CATALOG because this book contains a detailed description of every diesel engine made and sold in these United States. No matter what competition you run into, you can turn to this book and find the answer. Ask yourself why 121 Fairbanks, Morse salesmen carry this book in their cars; why 22 General Motors field men use this book as standard equipment, so to speak; why 27 of Worthington's top diesel salesmen use this book most every day. If you haven't got your copy of DIESEL ENGINE CATALOG, Volume 15, send a check for $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California, and the book will be on its way the next day.

Safety and savings tip!

Illustrated—a few of many types of Sylphon Packless Valves. Sizes range from ⅛" to 6". No. 304-NV is especially suited for vacuum service.

Sylphon Packless Valves prevent leakage—in or out

● Once Sylphon Packless Valves are installed on pipe lines carrying gasoline, oil, or other volatile liquids and vapors, leakage stops instantly! You and your equipment are protected against possible fire, explosion or other damage. You gain more, too. For these valves prevent wastage—provide vacuum protection.

There's no packing to leak or replace. A rugged, seamless Sylphon metal bellows replaces customary packing. The bellows eliminates leaks that might seep past the stuffing box of even the best packed type valve. It seals the valve stem against corrosive, dangerous or inflammable liquids or gases.

Many sizes and types made of brass, monel, stainless steel, etc. Widely used in chemical plants, oil refineries, power plants, aboard ships. Ideal as standard equipment. Get complete information; write for Bulletin EL-813

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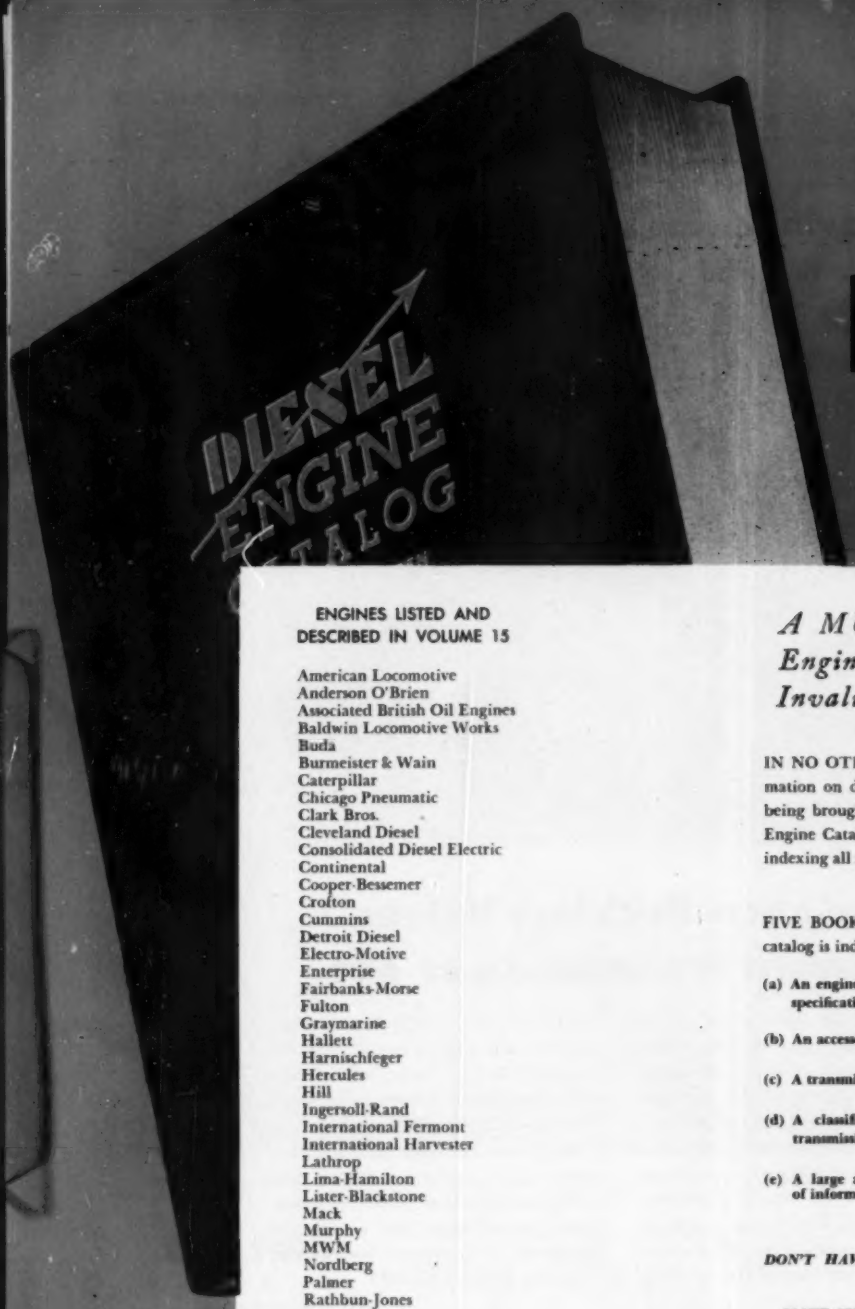
Canadian Representatives, Darling Brothers, Montreal



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IN NO OTHER BOOK can be found such complete and detailed information on diesel engines and accessories. Rewritten in its entirety while being brought up-to-date, great attention has been given to make Diesel Engine Catalog an easy-to-read book. Its comprehensive classification and indexing all contribute to making any item easy-to-find.

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ORDER YOUR COPY TODAY!

Improved "Dry-Fan" Cooling Tower

Interior view of the Binks 2-B Series (left) and the 2-BB Series (right) Dry Fan cooling towers.

The Binks Manufacturing Company announced the development of a new and improved Dry-Fan cooling tower. These towers are of the blower type and are manufactured in two models. The 2-B Series is a single fan model available in 9 sizes, with capacities ranging from 3 to 30 tons of refrigeration. The smallest tower in the 2-B Series is 2 ft. by 2ft. by 6 ft.; the largest is 6 ft. by 7 ft. by 6 in. These towers are extremely compact, efficient and quiet. Air enters these cooling towers through a squirrel cage type fan at the bottom of the tower and is exhausted through the redwood draft eliminators at the top. For indoor installation, special adapter hoods are available for the top of the tower. These make it simple to connect the necessary exhaust ducts. The smaller models of the Series 2-B towers (capacities up to 7 tons) are shipped completely assembled. The larger towers are knocked down with complete instructions for easy and quick assembly. The Series 2-BB of Dry-Fan cooling towers are equipped with 2 double-inlet squirrel cage blowers. These are made in four sizes ranging in capacity from 32 to 60 tons of refrigeration. Their sizes range from 4 ft. 6 in. by 9 ft. by 7 ft. 6 in. to 6 ft. 6 in. by 11 ft. by 7 ft 6 in. Both towers are built and operate on the same principle. Both are equipped with "Rotojet" clog-proof nozzles and removable panels for inspection of nozzles. Copies of Binks Bulletins 46 and 47 which describe these new towers fully, including complete operating data are available on request to Binks Manufacturing Company, 3122 Carroll Avenue, Chicago 12, Ill.

National Safety Record

Shown receiving a National Safety Council flag are, left to right: Theodore F. Brown, oldest hourly rated employe at Plant No. 3 of EMD; David T. Mould, Safety Director of General Motors; and Andrew G. Finigan, Plant Manager.

A new national record for heavy industry operation without a lost-time accident has been set by Plant No. 3 of Electro-Motive Division of General Motors at Cleveland, Ohio. The plant, where General Motors diesel switching and road switcher type locomotives are manufactured, worked 5,294,960 hours without a lost-time accident. The daily work of the plant calls for continuous handling of heavy components of diesel locomotives, such as underframes weighing more than thirty tons and twelve-ton engines.

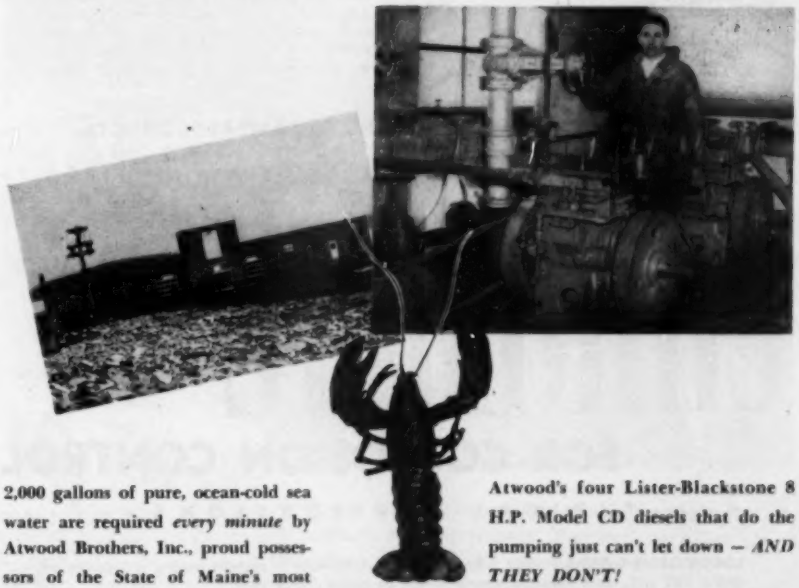
Diesel Generating Unit Purchased

The Baldwin-Lima-Hamilton Corporation has completed arrangements with the Electric Light and Power Plant of the Borough of Weatherly, Pa., for the delivery of a 1,000-kw. diesel engine generating unit to supplement the present steam power. The $98,016 diesel engine was partially financed by a $50,000 bond issue. The new engine will be used to generate additional power to Weatherly because of increasing industrial needs. Delivery is expected to take place in April, 1951.

Oil Salesmen Helped

Oil salesmen throughout these United States, throughout the world for that matter, have found the DIESEL ENGINE CATALOG of great value to them in their field work. This possibly explains why 57 Socony-Vacuum field salesmen have spent $570.00 amongst themselves to buy this book. When a field salesman spends $10.00 for a book like DIESEL ENGINE CATALOG, he has to know that it is going to do the job for him. This book does. This is a hearty recommendation to every other oil company field salesman. Buy a copy of the DIESEL ENGINE CATALOG today. Send $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California, and the book will be on its way to you the next day.

LISTER-BLACKSTONE DIESELS PUMP FOR PAMPERED LOBSTERS!



2,000 gallons of pure, ocean-cold sea water are required *every minute* by Atwood Brothers, Inc., proud possessors of the State of Maine's most modern lobster plant, and proud purveyors of the famous "Neptune's Purest" lobsters . . . 2,000 gallons per minute, pumped into 90 tanks totaling 100,000 pounds of live-lobster capacity.

Atwood's four Lister-Blackstone 8 H.P. Model CD diesels that do the pumping just can't let down — *AND THEY DON'T!*

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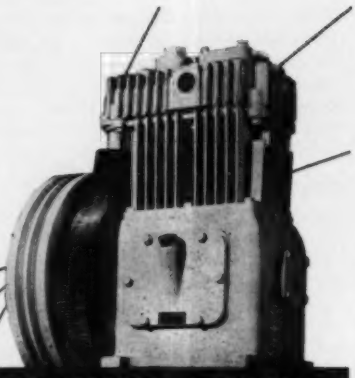

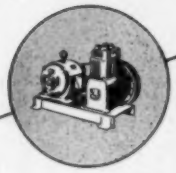

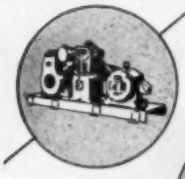

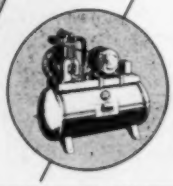

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LOCOMOTIVE DIESELS — Add 6 lbs. of Sodium Chromate to systems having a capacity of about 250 gal., and maintain concentration at about 2,500 ppm.

MARINE DIESELS — Start with about 2,000 ppm. of Sodium Chromate in the engine-jacket system, and maintain this concentration. Submarines and some other naval vessels provide an additional factor of safety by employing 5,000 ppm.

STATIONARY DIESELS — Start large installations with closed engine-jacket systems by adding 1,000 ppm. of Sodium Chromate; later maintain about 400 ppm. For smaller installations, employ higher concentrations. For open systems, start with 500 to 1,000 ppm. of Sodium Chromate and lower the concentration over a period of 1 to 3 months to the lowest maintained concentration at which protection is satisfactory, usually about 200 to 500 ppm. For large open systems employing cooling towers, use Sodium Bichromate and adjust to pH 7-9.

Write for complete information about the application in which you are interested.

SODIUM CHROMATE • SODIUM BICHROMATE
POTASSIUM CHROMATE • POTASSIUM BICHROMATE

MUTUAL CHEMICAL CO. OF AMERICA
270 MADISON AVENUE NEW YORK 16, N.Y.

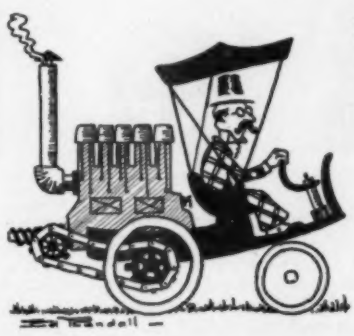
Demineralizer Has Direct Reading Meter

Barnstead engineers report that their Bantam Demineralizer is now equipped with a direct reading meter which indicates water purity. This feature enables anyone to tell the purity of the water at any time and maintain a constant purity check on the flow of demineralized water. The instrument is calibrated in parts per million and also in ohms electrical resistance. It is also complete with a needle type regulating valve for flow adjustment, a drain valve and a base for bench mounting. The base may be removed for wall mounting. The manufacturers report that the Bantam Demineralizer is ideal for industrial operations and applications requiring relatively small amounts of demineralized water. Bulletins on this equipment can be obtained by writing Barnstead Still and Sterilizer Co., 2 Lanesville Terrace, Forest Hills, Boston 31, Mass., or from laboratory supply dealers who also stock the replacement cartridges.

West Coast Engineering Representative

H. J. Keizer

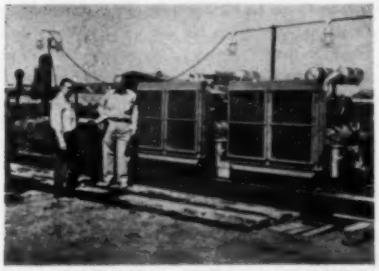
The appointment of H. (Hank) J. Keizer as west coast sales and engineering representative has been announced by Walter K. Davies, president of Lister-Blackstone, Inc., diesel engine manufacturers. The position is newly created and will be one of working with Lister-Blackstone distributors and authorized dealers throughout the west coast territory. Mr. Keizer brings to his new appointment 16 years of sea-going experience as engineering officer on diesel vessels. He was formerly with Fairbanks-Morse as design engineer and in marine sales in the San Francisco area. Headquartered in San Francisco, Mr. Keizer will travel the entire Pacific coast from Seattle to San Diego, assisting in the selling and engineering of Lister-Blackstone installations in the marine and stationary field throughout the area.



Scandinavian Diesel Association

Representatives of the Scandinavian diesel industry came together recently and founded a new association to be known as "The Scandinavian Diesel Association." Their plan is to work for a wide study of the technical progress in the diesel industry, not only in Europe, but also in these United States. Particularly is the new Association interested in what is going on over here. One of their first programs is to start a special study of the use of diesel engines in the eleven western states. Headquarters of the Association will be located in the University of Oslo, the capital of Norway. The illustration above is of the building in which the Association offices will be located.

Multi-Engine Flexibility



M. I. Fillmore of Fillmore Drilling Company, Bakersfield, accepted delivery of the GM Diesel "Twin 6" and "Twin 4" from T. E. Lawless of Lawless Brothers, Inc., Bakersfield, Calif.

The flexibility of multi-engine diesel units is demonstrated in a mud pump compound in the service of the Fillmore Drilling Company of Bakersfield, California. The power plant consists of two GM diesel "Twins" recently delivered to the drilling company by Lawless Brothers, Inc., GM diesel dealers at Bakersfield. This rig is not unique, but it is an example of how the range of efficient pumping power is increased by the use of several engines instead of a single large engine. The Fillmore unit is an Ideal C-250 mud pump powered by one "Twin 4" and one "Twin 6" diesel. Because any one engine or any combination of engines in these multiple units can be started and clutched in at will, the company has power available in eight different cylinder combinations—4, 6, 8, 10, 12, 14, 16, or 20. The chart below shows how this is accomplished.

	CYL	ENGINES OPERATING							
TWIN 4	4	✓		✓			✓		✓
	4			✓	✓		✓	✓	✓
TWIN 6	6		✓		✓	✓	✓	✓	✓
	6					✓		✓	✓
NO. CYLINDERS WORKING		4	6	8	10	12	14	16	20

THIS CHART SHOWS THE FLEXIBILITY OF TWO "TWIN" ENGINES COMPOUNDED TO ONE MUD PUMP.

Although the operation may seldom, if ever, call for the use of less than 10 or 12 cylinders, this flexibility eliminates the necessity of idling an engine along with light loads or stalling it down with overloads. As the required mud pressures increase or decrease engines are simply clutched in or out. Another advantage is the fact that any engine can be cut out for maintenance without shutting down the job. Engines may be also rotated, thus contributing longer life to the entire unit. Over-all dimensions of the equipment are 90 in. in width by 30 ft. 10 in. in length. Using a National No. 75 rig and the Ideal C-250 pump, Mr. Fillmore recently completed a well at Gosford, California, drilling 7,800 ft. in approximately twelve days.

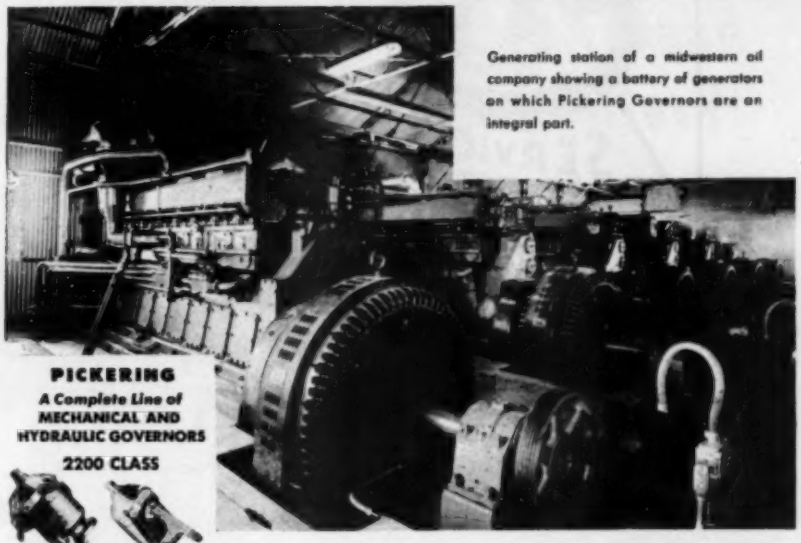
Caterpillar Appointment

E. A. Tiarks

E. A. Tiarks has been promoted to assistant sales manager in Caterpillar Tractor Company's western sales division, it has been announced by B. L. Hagglund, western sales manager. Mr. Tiarks, who has served as agricultural representative and direct representative in the west, will headquarter in Spokane, Washington. R. M. Richards, Portland, Oregon, who has been Mr. Tiark's assistant, succeeds the latter as district representative.

PICKERING

Synonym for dependability since 1862



Generating station of a midwestern oil company showing a battery of generators on which Pickering Governors are an integral part.

PICKERING

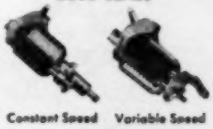
A Complete Line of

MECHANICAL AND HYDRAULIC GOVERNORS

2200 CLASS

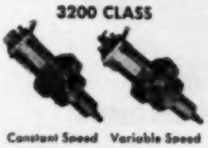
Constant Speed Variable Speed

2600 CLASS



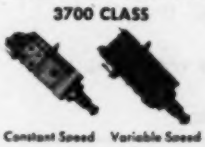
Constant Speed Variable Speed

3200 CLASS



Constant Speed Variable Speed

3700 CLASS



Constant Speed Variable Speed

For 89 years, Pickering Governors have met and anticipated the needs of American Industry. They have more than established a reputation for fully-dependable, long-term service under every type of operating condition.

Today, Pickering stands ready to supply the right governor for the job — to supply the governor that will maintain operating efficiency at its peak regardless of service conditions.

To consult Pickering Engineers may be your passport toward more efficient and economical operation of diesel equipment.

THE PICKERING GOVERNOR CO.

Established 1862

88 LLEWELLYN AVENUE · BLOOMFIELD, NEW JERSEY

7614

Engine Test Chamber

The South's largest commercially owned test chamber for testing starting and operating characteristics of diesel and gasoline engines at temperatures as low as –80°F. has been installed in the Houston plant of Stewart & Stevenson Services. According to Mr. Joe Manning, vice president and general manager, this new installation is in line with the policy of directing company efforts in the field of low temperature winterization of diesel and gas engines for operation and starting at temperatures below –65°F. One of the contributing factors in the installation of the new cold test chamber, it was said, is the increasing demand of government requirements for diesel and gas driven generator sets for starting and operating at these low temperatures. To meet these demands, the company stated that Stewart and Stevenson Services were the first in the South to install a chamber capable of testing as low as –80°F. At the present time, the organization is producing diesel generator sets to operate under these extreme conditions. They are among the largest producers in the United States of such sets ranging from 10 to 150 kw.

Colorfully Illustrated Catalog

Detroit Diesel Engine Division of General Motors has issued a new 36-page catalog describing the Division's complete line of Series 71 2-cycle diesel engines for application in the industrial, petroleum and marine fields. The book covers single and multiple engine units from 2 to 24 cylinders with power ranging from 32 continuous to 780 intermittent horsepower. It contains data on GM diesel 2-cycle design and interchangeability of parts; a "select your power" chart covering 57 standard power take-off and 7 torque converter models; engine illustrations and an outline of Detroit Diesel Service facilities. Copies may be obtained from GM diesel distributors and dealers or write on your letterhead to Detroit Diesel Engine Division, Advertising Department, 13402 West Outer Drive, Detroit 28, Michigan.

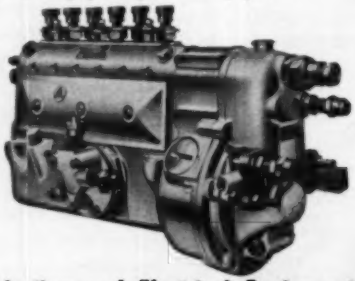
C.A.V. LIMITED SERVICE

Confidence Abroad

Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney — there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



C.A.V. Fuel Injection and Electrical Equipment

Service Depots throughout the World

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Sales Office:
14820 DETROIT AVENUE, CLEVELAND 7, OHIO

Special Representative for Nordberg

Howard H. Scott

The appointment of Howard H. Scott as a special representative handling marine diesel sales for the Heavy Machinery Division, has been announced by R. W. Bayerlein, vice president, Heavy Machinery Division, Nordberg Manufacturing Company, Milwaukee 7, Wisconsin. Mr. Scott is a graduate of the Massachusetts Institute of Technology and subsequently sailed on various ships of the United Fruit Company. During the last war, he served as a lieutenant in the U. S. Navy on active submarine duty. For the past 18 months, while on leave from American Eastern Corporation where he was serving as marine superintendent and assistant to the executive vice president, he was director in New Jersey for MIT's $20,000,000 development program.

The Nordberg Manufacturing Company has announced the appointment of Dakota Electric Supply Company, 1017-1023 Fourth Avenue N., Fargo, North Dakota, as distributor for Nordberg 4FS diesel engines. The territory covered by the new distributor includes the states of North and South Dakota, northwestern Minnesota and northeastern Montana. J. D. Farnham is president of the organization. Branch offices are maintained at Grand Forks, Minot and Bismarck, North Dakota and in Aberdeen and Rapid City, South Dakota.

Demonstration Device

A device to demonstrate the operation of the torque converter which is a component part of many automatic transmissions used in construction and industrial equipment has been developed for Detroit Diesel Engine Division by Ideal Models Company, 17255 Moran Avenue, Detroit 12, Michigan. The device is constructed entirely of transparent and colored plastics. The model is available for inspection at GM diesel distributors' and dealers' showrooms and is also available for use in engineering schools and colleges. For details address the Ideal Models Company.

DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 68.

River Towboats

One of seven new dieselized river towbats being built by Dravo Corporation for operation in the Pittsburgh area coal trade was launched last month into the Ohio River at Dravo's Neville Island Shipyard. The vessel, a 108-ft., twin screw barge pusher, was christened the *Crucible* by the sponsor, Mrs. W. P. Snyder, Jr., wife of the board chairman of Crucible Steel Company of America. Mrs. Snyder's aides were Mrs. W. P. Snyder III, wife of the vice president of Shenango Furnace Co., and Mrs. George Whitney Snyder, wife of the superintendent of the Combustion Engineering Department at Crucible's Midland, Pa. plant. The boat will operate between the firm's coal mine at Crucible, Pa., and its plant at Midland.

Two of the other boats are for Pittsburgh Consolidation Coal Company, and two are for Jones & Laughlin Steel Corporation. United States Steel Company and Island Creek Fuel & Transportation Company will get one each. The new boats will replace some of the picturesque old steam sternwheelers that have been the mainstays of Pittsburgh's vital river coal traffic for nearly a century. The *Crucible* is powered by two Superior diesel engines, each rated at 535 horsepower. The boats will normally handle six barges loaded with a total of 5,400 tons of coal. For improved "push" and maneuverability, the twin propellers are housed in Dravo Kort Nozzles A steel ring of airfoil cross section, the Kort Nozzle guides large quantities of water to, through and away from the propeller, enabling it to take a bigger "bite." Main controls are at the pilot's fingertips, eliminating the telegraph system to the engine room which was a feature of the older boats. Reversing gears on the *Crucible* enables engines to remain running in one direction, thus eliminating the necessity to stop engines in order to reverse. Crew quarters on the vessel consists of seven cabins. The galley is as up-to-date as any modern kitchen, containing a steel range and cabinet sink, large refrigerator and a food freezer. Equipment on the craft includes a radar system that permits navigation through fog.

Generator Production Boosted

Plans are under way for two new East Pittsburgh buildings of Westinghouse Electric Corporation that will increase by 65 per cent the capacity to produce giant electric generators. Mr. T. I. Phillips, vice-president in charge of East Pittsburgh divisions, announces that these new structures will provide more than 300,000 extra square feet for large generator production. This will make possible construction of larger than 150,000-kw. high-speed, 3,600-rpm. generators. The new four-story shipping and warehouse building, which will front on Braddock Avenue, will have five electrically operated tramrail cranes on the first floor and two on the second to expedite materials handling. Reversible rubber-belt conveyors will carry the bulk of smaller materials on all floors. Portions of the third and fourth floors will be used for offices.

Awarded Defense Contract

Hill Diesel Engine Corporation of Lansing, Michigan, has been awarded a $750,000 defense contract to build generator sets, it has been announced by the company. Hill Diesel was among those organizations which earned special citations for production records during World War II when it built generator sets for the armed forces.

New Sales Office

Harold C. Douda

Establishment of a new company operated sales office to service the northeastern Ohio area has been announced by the Power Plant Equipment Division of the Swartwout Company. The new office will be located at the company's main plant at 18511 Euclid Avenue, Cleveland 12, Ohio, and be under the direction of Harold C. Douda, recently appointed as district manager.

When is a Cotton Thread Not a Filter?
Photomicrograph of thread illustrated here gives you the answer. Note that it is a hollow tube. Obviously when compressed no oil can travel through it. See test tubes for proof.
See comparison of a compressed, unsupported cartridge with DELUXE. The spring, exclusive with DELUXE, prevents DELUXE cotton threads from collapsing or compressing.
compressed
maintained density
spring maintains density
compressed
WHY IS IT EASIER TO DRIVE OFF DILUTION IN CLEAN OIL???
Because clean oil gives off its dilution at engine crankcase temperatures of from 165° to 185° F whereas in dirty oil dilution is not driven off until temperatures of from 240° to 260° F are reached.
WHY IS THERE NO SUBSTITUTE FOR A DELUXE CARTRIDGE?
Only a genuine DELUXE has the spring-and-cone built right into the cartridge. Both are essential to DELUXE oil cleaning which travels the oil the full length of the filter instead of the short side to center way. There are many other reasons, too. Send for FREE "KEY TO CLEAN LUBRICATION" BOOKLET. Write DeLuxe Products Corporation, 1401 Lake St., LaPorte, Indiana.
DELUXE Oil Filter
DOES MORE THAN STRAIN OIL . . . MORE THAN FILTER OIL
ACTUALLY CLEANSES OIL
R-5223-DPR

Burgess-Manning Expansion

Expansion of facilities of the Burgess-Manning Company, manufacturers of exhaust and air line snubbers and noise abatement products, has been announced by W. L. Manning, president. Mr. Manning revealed that the company is setting up new divisions in Dallas, Texas, and in Chicago. A realignment of personnel at the Libertyville and Ashippun plants will take place. R. L. Leadbetter, vice president, has been placed in charge of the Dallas headquarters, established to handle sales, engineering and development in the petroleum industry, including refining, gas transmission and the petro-chemical fields. Use in the petroleum industry of snubbers to muffle exhaust and air intake noise on internal combustion engines and to prevent oscillation of gas and air lines has become widespread in recent years. Mr. Leadbetter will be assisted by G. S. Paddock as manager of sales and A. P. Gallagher as engineering assistant. Also, Mr. Dudley W. Day, director of marketing, has been named manager of the new Architectural Products Division. This division includes the company's newly developed radiant ceiling, the Acousti-Booth and other acoustical products. Headquarters of the Division will be in Chicago. Assisting Mr. Day will be A. C. Kelley, sales, and A. T. Jorn, engineering. C. P. Certick has been named manager of the Libertyville and Ashippun activities with H. A. Dietrich as manager of sales. The Libertyville plant will continue activities in the industrial and diesel locomotive fields and other company products, Mr. Manning said.

Cortez

ALMOST KILLED THE GOOSE!

Diesel liners get some mighty destructive treatment. So did Mexico, under Hernando Cortez.

For three years, he rode rough-shod over the Aztecs, massacring them and tearing down their cities to get his hands on more and more treasure.

Yet even the old Spanish conquistador finally saw that to keep it up would kill the goose—and leave him fresh out of golden eggs. So, in 1521 he began restoring all the damage.

Yes, that restoration paid him handsome profits—just as PORUS-KROME* and VANDERLOY M pay Diesel users. They are particularly glad now—with replacement parts in critical supply—to have long-wearing PORUS-KROME liners, that can be renewed almost indefinitely.

As for engine parts already made useless by the practice of remachining their bearing diameters—well, even junk liners—and *crankshafts* too—are restored to original dimensions with VANDERLOY M. It gives them a longer service life than new ones. And each restoration costs as little as the first.

**PORUS-KROME is dense, hard, wear and corrosion-resistant chromium applied by the exclusive Van der Horst process which gives working surfaces an infinite number of tiny oil-resisting reservoirs for perfected lubrication.*

VAN DER HORST CORPORATION OF AMERICA • OLEAN, N. Y.

U. S. PATENTS 2,048,578, 2,314,604 and 2,412,698

PORUS - KROME VAN DER HORST

Caterpillar Dealership

Herrick Tractor Co. has been appointed to a Caterpillar dealership with headquarters at Rio Vista and a branch store at Dixon, California, it has been announced by B. L. Hagglund, western sales division manager for Caterpillar Tractor Co. James Herrick, owner of the new dealership, is a veteran of the Caterpillar organization. After serving as a dealer for the Western Harvester Company, a former Caterpillar subsidiary, he joined the company in 1928 and from then until 1940 when he became associated with Cardwell Manufacturing Co., has been connected with Caterpillar's service and sales departments and with dealer organizations. Herrick Tractor Co. will handle Caterpillar, John Deere and allied manufacturer equipment.

Electric Fuel Pump

The Bendix Aviation Corporation, thorugh its Eclipse Machine Division, Elmira, New York, announces the new Bendix Automotive Electric Fuel Pump. This new fuel pump is now in production for the military services supplying fuel to coolant heaters and space heaters as well as supplying fuel to carburetors. It has wide possible adaptability for the marine and diesel fields, according to the manufacturer. A single pump will deliver up to 30 gallons per hour. Static pressures up to 7.0 psi are obtainable. A low power requirement of only 7 watts delivers maximum fuel. Total weight is only one pound, 13 ounces. Pumps now in production are for operation on 6, 12, and 24 volts direct current, with a 110-volt, alternating current version under development.

ABOE Names Executive Vice-President

Bosworth E. Monck, A.M.I. Mech. E., has been named executive vice-president of ABOE, Inc., New York, the American branch of Associated British Oil, Engines, Ltd., London, it was announced by Lord Pentland, chairman of the company's board of directors. Mr. Monck succeeds Ronimund Bissing, who recently resigned the presidency which he held since the company's formation in October of 1949. Mr. Bissing remains with the company as a director. Mr. Monck, a qualified diesel engine specialist, has been connected with the London company since the early days of World War II. He is a director of the British company and will retain that position. Since the war, Mr. Monck has specialized in market development with major emphasis on sales engineering cooperation with distributive outlets. The American company was organized as part of the international effort to make U. S.-British trade more self-sustaining. The parent British group is composed of Petter, Meadows, Petter-Fielding, McLaren, Mirrlees, and National. The British engines being marketed here are for the most part of smaller size than American types and thus offer little or no competition to domestic products.

Veteran Shovel

This 1½-yard Osgood shovel, powered by General Motors 6-cylinder diesel is shown working through Maryland's Sideling Hill Mountain where Highway 40 is being relocated between Hancock and Cumberland, Maryland. The job calls for removal of one million cubic yards of earth and rock. Contractor is M. J. Grove Lime Company of Frederick, Maryland. The shovel is over 19 years old and has fallen over a mountain twice.

Flaw Detection Speeded

Since introducing our readers to the Dy-Chek method of flaw detection last September with an article on pages 60 and 61, and again through an item in the January, 1951 issue, a large number of interested organizations have adopted the system because of its simplicity, convenience and low cost. Further application research enables users to save more time in handling. The Dye Penetrant Method, DPM for short, employs three easy to handle chemicals—a penetrant liquid of unusually high capillary attraction and low surface tension colored red, a volatile solvent which removes the penetrant from the metal's surfaces and a white developer which is a multi-purpose quick drying solution. The latter draws or "bleeds" the penetrant from whatever flaws it has penetrated and provides a white background for the brilliant scarlet of the dye penetrant. Even unseen, hair thin surface flaws become easily visible. All traces of the dye must be removed from the surface before the white developer is applied to insure the greatest sensitivity and positive results without smudge or obscured flaw detection. The dye penetrant will seek out every little corner and crevice so care must be taken to wash it out of all threads, holes, radii and corners.

Water can be used to help clean off the dye penetrant whenever and wherever possible. Although the dye is not water soluble, the dye remover is and dye removal is faster and easier with the use of water. The dye penetrant should first be loosened and washed free with the remover full strength. The emulsifying action of the remover will then permit the dye penetrant to be washed off with a clear water rinse. Small parts should be agitated in a bath of dye remover until the penetrant is completely loosened and emulsified, and then they should be flushed clean with clear water. On large pieces or large surfaces, the dye penetrant may be swabbed off with a sponge or rag soaked in dye remover. Before the water rinse, enough dye remover should be applied to completely emulsify the dye penetrant. An air and water gun may be applied to increase the impact of the rinsing stream. The same gun may be used to spray the dye remover onto the surface to be cleaned. This hastens the dye removal and will in many cases require less dye removal, thus reducing inspection costs. The process should be repeated until absolutely all traces of the dye penetrant has been removed. The surface to be inspected must present an absolutely clean appearance with no traces of the dye penetrant remaining. Dy-Check is manufactured by Dy-Chek Company (a division of Northrop Aircraft, Inc.), 1515 East Broadway, Hawthorne, California.

Diesel Engine Catalog

One hundred and twenty-one Fairbanks, Morse diesel salesmen have invested $1210.00 in individual copies of the DIESEL ENGINE CATALOG for the simple reason that these 121 diesel salesmen have found this book extremely useful to them in their day by day operations. Possibly one of the reasons for so many salesmen of this one company deciding to carry this book around with them in their cars is that all competitive information is contained between these two covers. This DIESEL ENGINE CATALOG, Volume 15, contains a detailed description of every diesel engine manufactured and sold in these United States. Its price of $10.00 is a very low one when compared with the usefulness of the information that it contains. Just send $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46 California, and a copy will be on its way to you the next day.

Since 1885
UNSURPASSED DEPENDABILITY...
Today's modern UNION Diesel products* incorporate and pioneer improvements which assure unsurpassed dependability for your —
Greater Safety • Lower Operating Costs
Long Term Satisfaction • Increased Profits
*DIESEL ENGINES
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GENERATOR SETS
HEAT EXCHANGERS
ALARM SYSTEMS
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2121 DIESEL STREET • OAKLAND 6, CALIFORNIA, U.S.A.

Riverboat Converted to Diesel

The Niagara River tug, *William D. Kropp*, owned by the Niagara Mohawk Power Corporation, has been converted from steam to a 200-hp. diesel electric drive. The vessel, now in daily operation, navigates short distances above Niagara Falls breaking ice formations at the intake to the power canals and tunnels. This operation is designed to prevent ice from blocking the flow of water through the canals and tunnels which supply power for the hydraulic turbines at the power company's Schoellkopf station. Because of the proximity of the vessel's operation to the falls and severe winter conditions on the river, officials of the power company sought a new form of propulsion that would be completely dependable for operation under the most difficult conditions.

Icing conditions that require sudden and frequent reversals at high torque values become considerably less difficult with the new installation since variable speed ratio is provided between the diesel engine and the propeller shaft through generators supplying powr to the propulsion motor. To meet emergency operating conditions during ice breaking, General Electric engineers have developed a control system that will develop an additional power output of 37½% with a corresponding increase in engine speed. This additional power will enable the craft to operate at 275 hp. for short period in case of heavy ice flows. The installation is a Marine Division of General Electric diesel electric drive.

Will Buy 30 Diesel-Electric Locomotives

A program of extensive dieselization of the Great Northern Railway was indicated with the road's executive committee announcement of the purchase of 39 diesel electric locomotives. The new equipment includes thirty 1,500-hp. road locomotives and switchers, seven 1,200-hp. switchers and two 800-hp. switchers. The cost will come to $5,500,000. Delivery of the equipment is scheduled for this year. All equipment will be by Electro-Motive Division of General Motors.

Two Promotions

James B. Lightburn

William K. Abeles

Two important promotions in sales personnel have been announced by Purolator Products, Inc., of Rahway, N. J., manufacturers of automobile oil filters and other filtration equipment. James B. Lightburn, formerly sales manager of the National Accounts Division, has been appointed assistant to Carlos D. Kelly, vice president in charge of sales. Mr. Lightburn will be in charge of coordination of Purolator's over-all sales program. William K. Abeles, formerly a representative in equipment sales, succeeds Mr. Lightburn as sales manager of the National Accounts Division which handles Purolator's oil company marketing activities. Joining Purolator in September, 1946, as special assistant to the factor manager, Mr. Lightburn later served as purchasing agent. A survey made by him resulted in the creation of the company's National Accounts Sales Division. Mr. Abeles came to Purolator in July, 1948, as a representative in the original equipment sales division.

Where
POWER FAILURE
MAY MEAN
DISASTER
SYNCHRO-START controlled Engine Generator-Sets will instantly provide a continuous flow of auxiliary power for the duration of the failure.
Within seconds after the main power fails, the SYNCHRO-START CONTROLS automatically bring in stand-by generator sets to provide emergency power. When the main service is restored, this same control stops the engine and resets itself for the next power demand.
Besides automatically Starting and Stopping the engine, our Model 1436 control protects the engine against any abnormal conditions while running — such as, low oil pressure, overheating, fuel or ignition failure, overspeeding and over-cranking, in which case it will stop the engine and signal an operator with visual or audible alarms and indicating lights in the control to show the exact cause of the trouble, should it ever occur.
SYNCHRO-START AUTOMATIC CONTROLS can be furnished for any model and any number of internal combustion engines used for any power application. Their use throughout the world for the past 20 years has proven their dependability, safety and economy.
Ask your engine manufacturer, dealer, architect, engineering firm or write us for information and catalogue describing our full line of control products.
SYNCHRO-S
8151 NORTH RIDGEWAY AVENUE, SKOKIE, ILLINOIS

Low-Cost Thermostat for Large Diesels

One of the factors which contributes greatly to the efficient operation of an engine is its cooling water temperature. Manual control of water cooling systems does not make for the highest efficiency and certainly does not make for the best engine performance or long life. The problem of thermostatically controlling the coolant in small engines has generally been solved. However, the pressing need that needed fulfilling has been the development of an efficient thermostat that would operate satisfactorily and inexpensively on medium and large size diesels. The American Motors Company has developed a thermostat that appears to have solved this problem. Their "Amot" thermostats are equipped with a positive three-way valve action. When the engine is started up and is cold, the "Amot" causes all the water to be positively passed back into the engine, thus providing the quickest warm-up period possible. After warm-up, the water is by-passed and automatically mixed with the cold water returning from the heat exchanger or other cooling device to produce the desired jacket water outlet temperature.

Once installed the "Amot" thermostats require no adjustments. Elements are easily replaced by unbolting the housing. Since the manufacturers of the "Amot" work closely with engine builders, the latter's recommendations as to temperature range should be followed. Generally, the 120°F. model should be used with direct salt water cooled diesels. This temperature is well below the point at which salt will deposit in the water passages of large diesels. For marine and stationary engines using heat exchangers or other fresh water systems, the 140°F. model is a good all-around model because it produces a good jacket operating temperature. The temperature into the engine is low enough to maintain a low lubricating oil temperature if an oil cooler is used in the fresh water system.

For lubricating oil temperature control, the "Amot" thermostat is used directly in the lubricating oil line. The oil will by-pass the heat exchanger when cold and will reach the desired operating temperature rapidly. When warm, the correct amount of oil will be circulated through the heat exchanger to maintain the desired oil-to-bearings temperature automatically. Elements for the 2-in. to 6-in. sizes are all interchangeable and the operating temperature of any thermostat can easily be changed by changing the element. The "Amot" thermostats are manufactured in all-bronze and in cast iron with bronze fittings. For a copy of the catalog folder describing the thermostats and giving specifications write to DIESEL PROGRESS File No. 79, P.O. Box 8458, Cole Station, Los Angeles 46, California.

Institute on Diesel-Electric Problems

The University of Wisconsin entertained a large group of Wisconsin workers in the diesel field last month when its Extension Division and College of Engineering sponsored an institute on problems with diesel-electric power plants. The program was for operating personnel of stationary equipment in public utility and industrial applications. The opening feature was a talk by Professor B. G. Elliot. Other speakers included the following: Fraser Jeffrey, Allis-Chalmers, Milwaukee; R. H. Beadle and W. C. Fischer, Fairbanks, Morse & Co., Beloit; H. J. Kinkade, Young Radiator Company, Racine; Harold Lambertus, American Bearing Corp., Indianapolis; C. N. Bentley, Deluxe Products Corp., La Porte, Ind.; R. E. Poole, Sinclair Refining Co., Chicago; Walter Stone and William Pfanstiel, Woodward Governor Co., Rockford, Ill. Certificates were presented for attendance.

DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 68.

"Long Run" Jobs call for Diesels . . .
and DIESELS call
for this "LONG RUN" Oil
D-X
D. H. D. MOTOR OIL
with EXTRINOL
When Diesels must be operated for long hours at a time, they require an oil that stands up at high temperatures and under high pressures. That's why so many Diesel operators rely on D-X D. H. D. with Extrinol.
Extrinol is the "extra" in D-X D. H. D. that gives better protection for bearings, higher heat resistance. It prevents foaming and fights sludge and varnish formations. Try D-X D.H.D. Motor Oil with Extrinol, backed by the famous D-X Trial Bond. Call your nearest D-X bulk station or distributor, or write direct.
PROCESSED · PARAFFIN
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MOTOR OIL
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EXTRINOL
D-X
MID-CONTINENT PETROLEUM CORPORATION
TULSA, OKLA.
Waterloo, Ia.
Terre Haute, Ind.
Omaha, Nebr.
Chicago, Ill.
Minneapolis, Minn.

Completes Consolidation

The National Supply Company's Engine Division has completed consolidation of its sales and service facilities with those of the Atlas Imperial Diesel Engine Company, according to Mr. F. H. Kilberry, Engine Division general manager. The purchase of the assets of the Atlas Engine Company by the National Supply Company was consummated in July, 1950. As announced by Mr. Kilberry, this consolidation enables the company to offer extensive sales and service facilities on National's Atlas and Superior diesel, gas, dual-fuel and Chrysler marine gasoline engines.

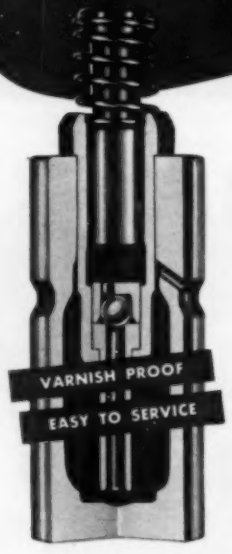
Various sales branch offices have been established. The Terminal Island, California branch at 1048 South Seaside Avenue, is managed by Mr. J. A. Flynn and is the headquarters for Mr. W. M. Griffith, special representative. In San Diego, California, the office is located at 1745 Pacific Highway and managed by Mr. J. R. Watson. The Oakland, California office at 2510 Grove Street, will function as a central west coast parts warehouse under the direction of Mr. David Ury. Mr. J. H. Czock, special representative, also operates from this office. The Portland, Oregon, sales and service branch is located at 237 S.E. Union Avenue. It is managed by Mr. A. C. Fries. Mr. C. H. Caudy, sales engineer, also operates from this office. All sales and service facilities in Astoria, Oregon are under the jurisdiction of Mr. E. F. Olson. It is located at 131 Seventh Street. The Seattle, Washington, sales and service branch, located at Salmon Bay Terminal, is under the direction of Mr. F. G. Hudson. Chrysler marine engine sales in Seattle will be conducted through Mr. L. K. Zankich and Mr. W. A. Russell. At Vancouver, British Columbia, the sales and service branch at 1859 West Georgia Street is managed by Mr. J. C. Alger. Mr. D. C. Y. Simpson, sales engineer, also operated from this office. Mr. R. W. Strong directs the Ketchikan, Alaska, sales and service branch at 900 Water Street.

EATON

Zero-Lash

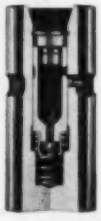
HYDRAULIC VALVE LIFTERS

—automatically maintain zero clearance in the valve train at all times



Zero-Lash opens the door to:

- Cam design improvement for optimum engine operating efficiency.
- Freedom from loss of efficiency from varnish and sludge.
- Perfect tappet adjustment for the life of the engine under all engine operating speeds and temperatures.
- Longer and better service for valves and seats.
- Silent valve train operation.
- Smoother idling.

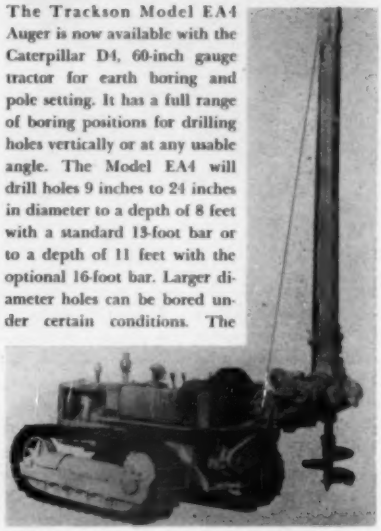


Eaton engineers welcome the opportunity to discuss application of its multiplicity of hydraulic valve lifter designs to engines proposed or now in design.

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO
SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Boring Machine



The Trackson Model EA4 Auger is now available with the Caterpillar D4, 60-inch gauge tractor for earth boring and pole setting. It has a full range of boring positions for drilling holes vertically or at any usable angle. The Model EA4 will drill holes 9 inches to 24 inches in diameter to a depth of 8 feet with a standard 13-foot bar or to a depth of 11 feet with the optional 16-foot bar. Larger diameter holes can be bored under certain conditions. The solid auger bar is square, permitting full bearing contact through the driving head. It has a 5,000-pound capacity which handles poles up to 50 feet in length. The tractor has the 5-roller non-oscillating track frame, large front idlers and 16-inch grouser tracks which provide stability and balance in all types of terrain. Heavy duty track roller guards are offered as added protection for operations under adverse conditions.

Heads Engineering Development Section

Dr. Maurice Nelles

Dr. Maurice Nelles, recently director of the Engineering Experimental Station and professor of Engineering Research at Pennsylvania State College, has been appointed director of Borg-Warner's Engineering Development Section according to an announcement made by Roy C. Ingersoll, president. In his new position, Dr. Nelles will head the company's product development and research laboratory in Bellwood, Ill. Widely known for his research work in mechanical, electrical and metallurgical fields, Dr. Nelles has designed equipment for deep-sea research, and was in charge of surface operations when Otis Barton made his 4,500-ft. dive in the bentoscope to establish a new record.

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Free-Piston Power Plant

Details on a revolutionary free-piston power plant for diesel operation which combines the thermal efficiencies of conventional diesel engines with the advantages of gas turbine operation are contained in a report made available to the American public by the Office of Technical Services of the U. S. Department of Commerce. The new report, supplementing information on this French development previously published in the United States, deals with the problem of obtaining operating stability in the floating piston gas generator. According to the report, this achievement has been made possible despite the absence of connecting-rod and crankshaft linkages. The free-piston gas producer is actually a highly supercharged 2-cycle diesel engine. A piston-driven engine produces exhaust gas at 75 psi. pressure and a temperature of 900-950°F. The useful power comes from a gas turbine in which exhaust gas is expanded to atmospheric pressure. The bulletin, PB 100 124, "Operating Stability of Floating Piston Gas Generators," is obtainable from the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C. It consists of 19 pages including photographs and sells for $1.75 in microfilm and $2.50 in photostatic form. Checks should be made payable to the Librarian of Congress.

Elected Treasurer

L. G. Porter

The election of L. G. Porter as treasurer of Borg-Warner Corp. was announced by Roy C. Ingersoll, president. Mr. Porter had been vice president and secretary of the Calumet Steel and Franklin Steel divisions of Borg-Warner since 1947. In assuming the office of treasurer, Mr. Porter succeeds Mathew Keck who was secretary-treasurer of the corporation from the time of its founding in 1928 until last year when he was elevated to a vice presidency. Ray W. Doue holds the position of secretary.

General European Manager

W. A. Finn has been named general European manager, with offices in Paris, of Worthington Pump and Machinery Corporation, Harrison, N. J., according to an announcement by S. R. Williams, vice president in charge of foreign business. Mr. Finn replaces A. W. Fraser who is assuming an executive sales position with Worthington and will make his headquarters in Chicago.

Second Major Expansion

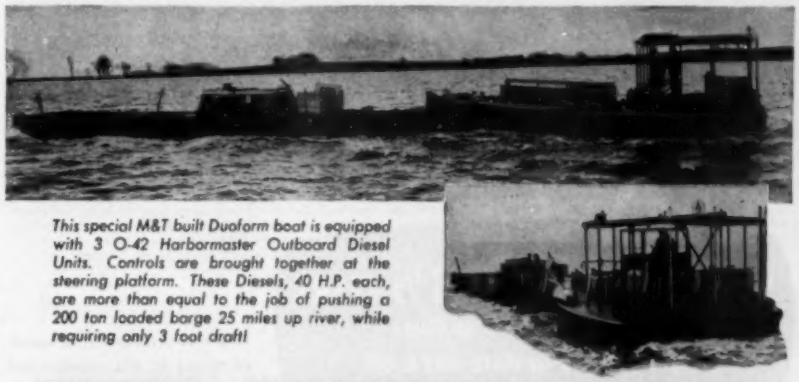
The second major expansion in the last few months has been announced by Cummins Engine Company, Inc., of Columbus, Indiana. The most recent plans outlined by R. E. Huthsteiner, executive vice-president, include an immediate extension, 9,600 square feet, on the DD fuel pump building, completed only 18 months ago. An expenditure of about 400,000 is involved. These new buildings and facilities, which are expected to be ready for use early in the second quarter, will increase the size of the plant more than 30 per cent and boost to more than $6,000,000 the amount Cummins will have expended since the end of World War II. Production capacity in the period of five years has been increased about 60 per cent.

Mexican Sale

Mr. Marte Gomez, president of the newly-formed Worthington de Mexico, revealed that his company has sold a diesel engine to Negociacion Minira, Santa Maria de la Paz y Anexes en Matehuala, S. A. The SEH-8 diesel engine with a 1,000-kw. Electric Machinery generator will be used to furnish power for the company's hundred year old lead and gold mines. The installation is to be at Villa de la Paz, S. L. P., near the famous Catorce Mine and approximately 20 kilometers from Matehuala, S. L. P. Matehuala is an Indian town which means "bad water" and was founded in 1450.

Expands Laboratory Facilities

The Illinois Institute of Technology's Armour Research Foundation announced a 30 per cent expansion of its engines and lubricants and heat transfer laboratory facilities. Some 1,800 feet of floor space has been added to house a new 200-300-hp. Sprague-type electric dynamometer, fuel metering and weighing equipment, recording temperature instrumentation, and additional specialized equipment for engine development projects.



This special M&T built Duoform boat is equipped with 3 O-42 Harbormaster Outboard Diesel Units. Controls are brought together at the steering platform. These Diesels, 40 H.P. each, are more than equal to the job of pushing a 200 ton loaded barge 25 miles up river, while requiring only 3 foot draft!

URGENT PROPULSION PROBLEM SOLVED WITH OUTBOARD POWER

UP a river, through impassable forest, to build a paper mill in Pakistan presents some tough problems in transportation and propulsion . . . but Harbormaster Outboard Propulsion And Steering Units *have been chosen* for this urgent job that can't be accomplished with ordinary marine power.

Harbormasters were the choice against the field for powering this job, another example of *outboard power* superiority. The special M&T pusher type boat illustrated, equipped with 3 Harbormaster Outboard Units, will be used for pushing 200 ton barge loads 25 miles up a shallow river, and will require only 3 foot draft!

Decisive features here included Harbormaster's shallow draft; 360° Propellor Thrust Steering Control; and Patented Shear Pin which automatically shears off should underwater assembly strike a submerged obstacle.

Write today for Harbormaster Catalog (over 70 photos and diagrams) so that you'll have complete data on file on advantages of outboard power

Murray & Tregurtha
HARBORMASTER
Outboard Propulsion And Steering Units

Murray & Tregurtha, Inc.
6 Hancock St., Quincy 71, Mass.

Please send catalog, without obligation, of Harbormaster Outboard Propulsion And Steering Units.

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Company _____

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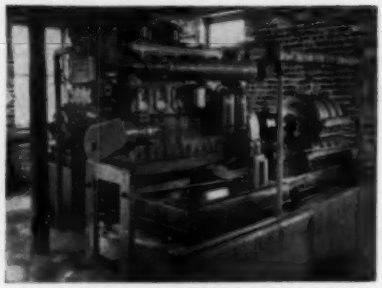
Outboard Propulsion . . . Heavy Duty Power With Outboard Maneuverability

Standby Water Pumping Unit



There's little chance of finding a dry water tap in Lincolnton, North Carolina, with the independent pumping unit standing by. The unit occupies small space but provides plenty of power to safeguard the town's water supply in case of emergency. It consists of a 6-cylinder GM diesel engine driving a Dayton-Dowd pump. The unit is operated one hour per day to assure availability whenever needed. The engine starts pumping operation at the press of a button.

Revised Catalog Bulletin

A revised catalog bulletin covering Columbia Tong Test Ammeters has been issued by the Columbia Electric Manufacturing Co., 4519 Hamilton Ave., N. E., Cleveland 14, Ohio. The Tong Test Ammeter, an instrument which can be used to measure current in both ac. and dc. lines, does not require breaking the circuit or insulation. Voltage readings can be taken with the Voltor voltage attachment. For a copy of the catalog bulletin, write the company at the above address.

New Diesel Unit

A new diesel unit, the Mogul Six, of 1,905 cubic inches displacement and carrying a maximum continuous output rating of 201 hp. with overload capacity of 272 hp. is now in production at the Waukesha Motor Company's 20-acre engine plant in Waukesha, Wisconsin. This latest addition to the company's expanding diesel line fills the gap between its Super-Duty Model of 1,197 cu. in. and its largest diesel, the Giant Six of 2,894 cu. in. The Mogul Six is a six-cylinder, four-cycle, solid injection full diesel with a bore of 7 inches, stroke of 8¼ inches, and displacement of 1,905 cubic inches. It has the patented, spherical combustion chamber characteristic of all Waukesha diesels and is recommended for use with all modern, "high speed diesel fuels" of 45 cetane or above. A quick conversion kit is available to convert this engine in the field from diesel to natural gas, and vice versa, without any internal parts being changed.

Acting Regional Manager

Charles J. Wilhite

Charles J. Wilhite, who started with Cummins in 1939, has been promoted to Acting Northwest Regional Manager of Cummins Engine Company, Inc. His headquarters will be 809-810 Security Building, Seattle, Washington. Since his return from four years of service with the U. S. Army Engineers, he has been Northwest Regional Service representative. Ralph J. Shields, a Navy veteran, succeeds Mr. Wilhite as Northwest Regional Service representative. Mr. Shields has been with Cummins for the past four years.

New Caterpillar Distributors

Caterpillar Tractor Company has announced the appointment of two new distributors in the state of South Dakota. West River Equipment, Rapid City, South Dakota will merchandise Caterpillar products in the western portion of the state. This organization is headed by S. S. Roberts, president and J. P. Roberts and Hugh Vallette. J. P. Foster Company, Sioux Falls, South Dakota, the new distributor in the western part of the state, is headed by John Foster, a native of Sioux Falls.

Railroad Completely Dieselized

Baldwin-Lima-Hamilton Corporation has received an order from the New Orleans Public Belt Railroad for two model S-8, 800-hp. diesel electric switching locomotives. The acquisition of these new locomotives will result in the complete dieselization of this railroad with fourteen diesel electric locomotives, all Baldwin built. The first units were purchased in 1937.

This VAPOR PHASE equipped engine has now broken all existing performance records

WENT INTO SERVICE JULY 1939 • NOW, FEB. 1, 1951, RECORDS SHOW:

100,279 HOURS IN 11½ YEARS
(ON UNTREATED ACID FUEL)
Repair Costs to date $478.69

In a truck, driven at a speed of 30 m.p.h., this would equal a total of 3,008,370 miles!

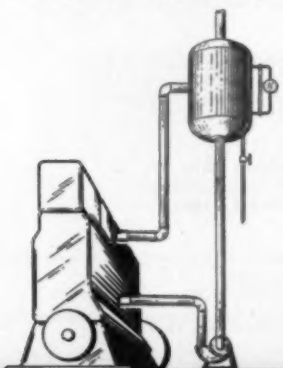
All *original* Cylinders, Pistons, and Inlet Valves *still in service!*

That is today's incredible performance record of the VAPOR PHASE equipped 40-H.P. Enterprise 1000 R.P.M. Engine operating on *ordinarily harmful raw sewage gas fuel* in the Visalia, California Sewage Plant.

And equally amazing is the fact that, back in '39, this engine replaced an identical conventional system engine (*without Vapor Phase*) that had broken down completely after only 5 months' service. *Acid type fuel did it!*

Visalia knows that under such tough conditions, such engine efficiency and operating economy would be impossible *without* VAPOR PHASE. So now, in this same plant three more 80-H.P. VAPOR PHASE equipped engines are now in operation.

This world's record VAPOR PHASE performance is not uncommon. It is just that this is one of the *first* VAPOR PHASE units, serving under the most rugged conditions.



VAPOR PHASE *YOUR* ENGINE•*SAVE MONEY*

Regardless of engine size or type—Diesel, Gasoline or Gas—regardless of fuel used, load requirements, altitude or ambient temperatures—anything from sub-frigid to burning desert—VAPOR PHASE converts your conventional cooled engine into a long-life super-efficient power unit. And saves you almost unbelievable operation costs!

AND THAT'S NOT ALL!

Vapor Phase equipped engines *also* serve the multi-purpose job of generating steam, heating water, fluids, space or other process (including cooling or heating through air conditioning systems)—each as required or all at the same time for the cost of engine operation *only*.

VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

STOP THROWING GOOD MONEY AWAY! WRITE OR WIRE FOR INFORMATION

Offices in Most Principal Cities

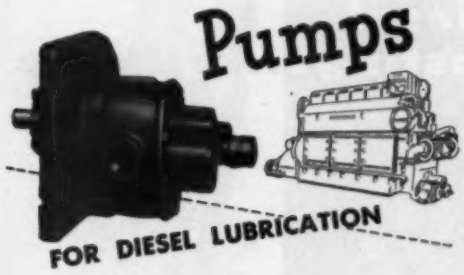
ENGINEERING CONTROLS, Inc.
2835 East Eleventh St., Los Angeles 23

Detroit Sales Meeting

The entire sales force of Federal-Mogul Corporation Service Division convened in Detroit last month to launch the 1951 merchandising program for their line of sleeve bearings, connecting rods and Bower Roller bearings. Managers and salesmen from 16 districts in the United States and Canada joined with home office personnel in appraising 1950's record operations and mapping a larger quota for 1951. Corporation officials and representatives of the Bower Roller Bearing Company also entered into the series of conferences at the headquarters in the Statler Hotel. Approximately 100 persons were in attendance at all times, making this the largest such conference in the division's history. Neil A. Moore, Federal-Mogul vice-president who directs the Service Division, and T. L. Camp, supervisor of districts, presided at the meetings. Among the factors leading to their ambitious program for 1951 were the record number of vehicles operating today and the division's expanded branch system. Nine new branches were opened in strategic locations last year, bringing the total now operating to 68. Possible effects of governmental material allocations upon supply was discussed. Sales forecasts were based upon the presumption that high priority will be given to the maintenance of the country's civilian, farm and industrial vehicles.

Practical application of marine diesel engine theory at the United States Merchant Marine Academy at Kings Point, Long Island, N. Y., is part of the curriculum of cadet-midshipmen. Engines are assembled, disassembled, operated, checked and rechecked in the engineering department. This engine, a 6-cylinder, 420-hp. Superior, has a bore of 14½ inches and a stroke of 20 inches. Several valve covers and cylinder block cover plates have been removed to permit inspection of operating parts of the engine. These ten cadet-midshipmen have had a year's training and are about to go aboard Great Lakes vessels to get practical, first-hand experience afloat.

PROVIDING THE FASTEST, MOST ECONOMICAL METHOD KNOWN FOR CONNECTING AND DISCONNECTING PRESSURIZED FLUID-CARRYING LINES
Aeroquip
SELF-SEALING COUPLINGS
AEROQUIP CORPORATION
JACKSON, MICHIGAN
FLEXIBLE HOSE LINES, DETACHABLE, REUSABLE FITTINGS; SELF-SEALING COUPLINGS; "BREAKAWAY"; HYDRAULISCOPE



THE rotary geared pump shown above is particularly suited for diesel lubrication systems. It has a special flange mounting to facilitate installation together with provision for tachometer drive. Thousands of Brown & Sharpe Pumps are now providing trouble-free service for transfer, lubrication and booster systems. Get acquainted with their reliability and economy. Write for Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE

CHECK and COMPARE THESE FEATURES—

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.

Here's Why

Bendix

STARTER DRIVE

IS BEST

FOR ANY TYPE OF

DIESEL!

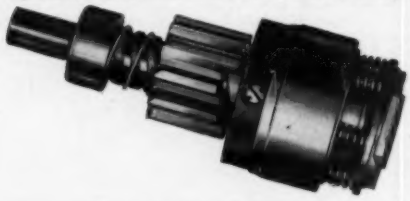
The exclusive design features and all-around efficiency of the Bendix* Starter Drive have been performance proven in over 85,000,000 installations. No other starter drive approaches this record of outstanding performance. Remember, whatever your type of diesel, it will pay you well to specify Bendix Starter Drive for economical installation and dependable performance.

*REG. U.S. PAT. OFF.

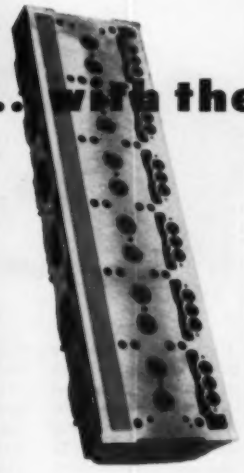
ECLIPSE MACHINE DIVISION of Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.



Rebuilt diesel castings.. with the Guth FUSION* PROCESS



Save yourself costly shutdowns. Save the expense of new castings. Send broken diesel heads, blocks, and castings to Guth for renewal by the Guth fusion process backed by 25 years of successful experience. Ask any Guth user or send today for illustrated catalog.

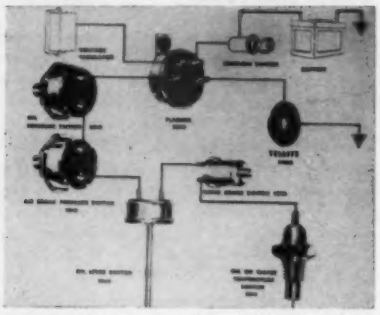
Dealerships available, write today for complete information.

* A specialized system of reconstructing damaged or worn castings to new or better-than-new condition conforming with latest factory specifications . . . fully guaranteed.

GUTH COMPANY

McPHERSON, KANSAS

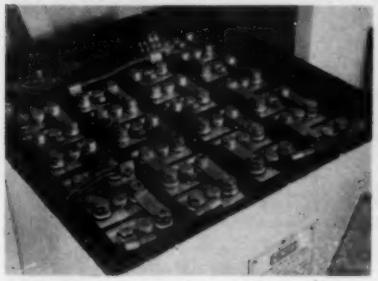
Signal Device



Over the past few years, the trend has been more and more toward automatic controls for diesel engines, industrial plant equipment, etc. These have taken two basic forms, namely control and warning devices. For engine application it is desirable to protect the engine against high water temperature, high lube oil temperatures, low lube oil pressures, etc. In the case of larger engines, it is sometimes desired to shut down the engines in the event of unbalanced load among the cylinders, indicated by excessive pressure or exhaust gas temperature. In short, owners like to reduce engine attendance to a minimum while at the same time protecting the engine from serious damage in the event of irregularities. Controls and warning devices for this purpose take many forms. Basically, these systems give a signal only when an abnormal condition develops. If there is no signal, it is assumed that a normal operating condition exists. Actually the light or buzzer in the signal may be off for any of four reasons: 1. A bulb may be burned out. 2. Wiring may be broken. 3. The switch or contact may be defective. 4. The condition is normal.

The Rochester Manufacturing Company's Tellite Signal System overcomes this deficiency in a signal system. A dim, visible light glows when all connected units are operating normally. It remains dim while the engine idles. A temperature rise, low oil or air pressure, or any other such condition which would make further engine operation unsafe or detrimental causes it to flash dim and bright, thus warning the operator. When the light is out, Tellite is warning of its own failure. Any number of pressure and temperature control switches may be used in this warning circuit without affecting the operation of the system. One warning light can be used to check a number of temperatures and pressure points throughout the engine or, if preferred, one separate light can be used for each part of the engine. Many typical warning system applications require controls in conjunction with them. Typical of this are the warning and control systems installed in railroad diesel locomotives. These are designed to warn of the source of the trouble, using flashing lights and buzzers and in addition reduce the speed or stop the engine before a dangerous condition develops. The Tellite pressure and temperature switches are designed to serve this role simultaneously or independently if desired. An important factor in the Tellite System is its comparatively low cost. More complete details on this warning device can be obtained from the Rochester Manufacturing Co., Inc., Rochester 10, New York.

One Battery Replaces Three on Barge



A current storage battery installation on tank barge *Texaco 398*, one of a number of petroleum barges of the Texas Company, operating on inland waterways, provides an interesting example of just what can be expected from a single battery. This particular installation, a Nicad SUO 18-H, 204 amp.-hour, 32 volt unit, manufactured by Nickel Cadmium Battery Corporation, is currently replacing the three 32 volt batteries that previously operated the two oil pumping engines and the ship's lighting and electrical system. Leads from the nickel cadmium battery are run out to the two diesel pumping engines and to the electrical system. Previous charging practice was to charge the two diesel engine batteries from generators on each engine, and to charge the lighting battery from a Homelite generator. Under this system, the lighting battery was charged once a day.

One of the advantages of the nickel cadmium battery was its capacity to take an overcharge without damaging or buckling of the plates. With the installation of this battery, the voltage regulators on the pumping engines were increased to 38 volts so that each 8-hour pumping period restores a good portion of the charge, saving at least 20 hours of charging time a week from the auxiliary generator. The diesel engine generators account for about 75% of the required battery charge at the present time. Since installations of this type of battery, additional electrical units have been added to the ship's equipment without any dislocation from overload. The main objective of this kind of battery installation is reduced battery maintenance, and, consequently, reduced cost.

Contributing to this objective is the already proven characteristic of low or negligible water consumption and the elimination of specific gravity records. Important too, when considering the vital need for trouble-free power supply in today's active fuel transportation program, is the relative elimination of human error. The resistance of the battery to damage from over-charging, or from leaving the battery on trickle charge too long, achieves this objective. Perhaps the most important expectation is that of long life which has been characteristically a feature of the nickel cadmium battery in marine service during many years of comparable European operation.

DIESEL ENGINE CATALOG is now available in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 68.

Increases San Francisco Staff

Walter H. Kraemer

The Cooper-Bessemer Corporation, has announced the appointment of Walter H. Kraemer to its field sales and service office in San Francisco, California. Since graduation from Purdue University in 1948, Mr. Kraemer has been associated with Cooper-Bessemer's sales efforts and with the company's recent development of new nodular iron, working directly under T. E. Egan, chief metallurgist, and L. F. Williams, assistant to the president, who has been directing the company's program.

Describes Clamshell Buckets

C. S. Johnson of Champaign, Illinois, a subsidiary of Koehring Company of Milwaukee, has issued an eight page catalog describing the merits of all-welded clamshell buckets. The manufacturer claims that welding saves weight and adds to digging strength and endurance. Welding keeps the clam smooth inside and out. Sticky materials slide out easily because of lack of projecting rivets or bolt-heads inside the clam. Copies of the bulletin may be obtained by writing to the C. S. Johnson Company or by contacting any Johnson distributor.

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RUSSELL NEWBERY

DIESEL & DUAL-FUEL ENGINES

7 to 150 H.P.

Robustly designed for continuous service and ease of maintenance and backed by forty years' experience.
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INDUSTRIAL
8 models 1–6 cylinders, 7/150 h.p. at 600/1000 r.p.m.
4 models 1–4 cylinders, 13/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings.)
60-cycle A.C. or D.C. Generator Sets up to 95 KW.

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8 models 2–6 cylinders, 18/150 h.p. at 1000 r.p.m.
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Generator, Pump and Compressor Sets for Shipboard use—range as Industrial.

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assure maximum performance and protection

Pierce Centrifugal Governors give exact control of engine RPM to meet the varying conditions of any job. Engine protection is guaranteed!

PIERCE governors engineered specifically for Diesels assure long, trouble-free operation . . . usually for the life of the engine. Many Diesels feature PIERCE as standard equipment to assure maximum protection, better performance and less maintenance.

PIERCE replacement governors to fit most engines are available through your local distributor.

For your distributor's name or for specific information on new engine design or special governing problems, write or call Sales Department, Pierce Governor, 1603 Ohio Ave., Box 1,000, Anderson, Indiana.

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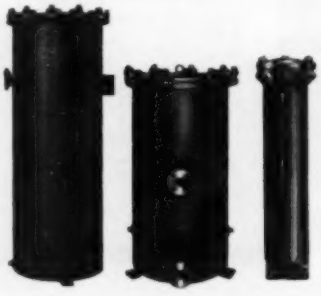
MICHIANA OIL FILTERS

- ENGINEERED FOR MODERN ENGINES
- PRACTICAL
- ECONOMICAL

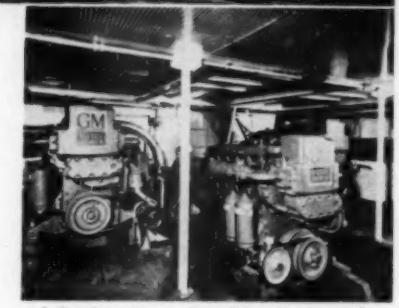
They Pay for Their Cost Over and Over Again



No One Accessory Does More For Engine Life and Performance Than a Good Oil Filter.

MICHIANA PRODUCTS CORPORATION
Michigan City, Indiana

Among the glamour yachts cruising Florida waters during the past winter was the 62-foot *Kitty III* owned by Mr. Ed Glatt, prominent Chicago sportsman. The craft is a triple screw Chris-Craft motor yacht powered by 3 200-hp. General Motors diesel engines. Top speed has been clocked at 21 mph. Facilities include ship-to-shore telephone, intercom telephone system with 7 stations, 15-ft. refrigerator, deep freeze unit, sponge rubber floor padding, lavatories, showers and modern navigation controls. The engine room is completely sound proofed with acoustical Celotex. A "110" and 32-volt diesel U. S. generator provides electricity.

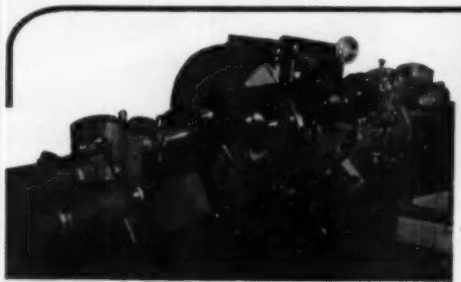


Radiators Described

The Young Radiator Company, Racine, Wisconsin, and Mattoon, Illinois, has announced the completion of a new catalog No. 1651 covering its line of "Mono-Weld" (trade-mark) radiators. The four-page, two-color piece shows the design features and accessories for both the one-piece and sectional-type cores. The one-piece "Mono-Weld" radiators are available in various sizes capable of dissipating from 70,000 to 800,000 btu. per hour under standard conditions. The sectional-type core units are of large size, ranging in capacity from 960,000 to 3,250,000 btu. per hour. These Young designed and produced radiators are said to be compact and sturdy for heavy duty gas, gasoline and diesel engine cooling. Core sizes range from 2½ ft. to 10½ ft. square. For full details and a copy of the new Young catalog No. 1651, write Young Radiator Company, Racine, Wisconsin.

Five Vice-Presidents Elected

The board of directors of The Electric Auto-Lite Company has elected five vice-presidents, Royce G. Martin, president and board chairman announced. They are James B. Fenner, formerly treasurer, named vice-president and comptroller; H. E. Hasemeyer, formerly assistant to vice-president in charge of manufacturing; R. M. Lake, who has been a director of the corporation; C. L. Lancaster, manager of the Sharonville, Ohio plant; and Lyman A. Wine, formerly assistant to the president.



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NATIONAL WELDING & GRINDING CO. 2929 CANTON ST. DALLAS 1, TEXAS

West Coast Diesel News

By FRED M. BURT

POWERED with a 90-hp. Washington diesel and 5-hp. Fairbanks-Morse diesel auxiliary, steel shrimp trawler, 54-ft. *Miramar*, has just been delivered to Ernest DeCima, Guaymas, Mexico, by Drake & Bullen, San Diego.

ON JANUARY 24, suddenly and unexpectedly, death came to Bob Dunn (64), more than 25 years with Sterling Truck Co., Los Angeles, who had, over the years of selling countless numbers of diesel-powered trucks, come to be one of the best known and liked truck salesmen in California.

THE Union Diesel Engine Company's Southern California branch has been relocated at 7206 Amherst Street, San Diego 15, and is still under the direction of T. K. (Kris) Vestergaard.

AS A COMMENTARY on the diesel-electric set demand and sales for 1951, Anderson-O'Brien Co., Los Angeles, manufacturers of such sets, included among other items, has three orders for 140 sets for early 1951 delivery; units to 60-kw., with General Motors diesel engines in the 25-hp. to 90-hp. range.

FOR THE Richfield Oil Corp., in the Cuyama Valley (Calif.) oil field, six more Clark Bros. 660-hp. natural gas compressors to augment natural gas treatment facilities; forcing gas back into the ground to maintain pressure at oil wells.

OBTAINING a fuel economy under full load of 7,000 btu. per bhp. a Cooper-Bessemer LSV-12, 2,770-hp. super-charged gas engine driving a 2,000-kw. G.E. generator, the latest addition to an industrial power plant near Tucson, Ariz. (supplementing three LS-8 gas-diesel, 1,850-hp. Cooper-Bessemers) is claimed to be the largest 4-cycle, straight gas engine ever put into operation.

UNDER construction by Steelbilt Cruisers, Oakland, a 42-ft. all-steel combination boat for Angelo Constanzo, San Francisco, to be powered with a 165-hp. General Motors diesel with 3:1 reduction gear supplied by West Coast Engine & Equipment Co.

LAUNCHED at Tacoma Boatbuilding Co. yard, 121-ft. tuna clipper *Countess*, Capt. Antonio Francisco, has 600-hp. Washington diesel for main power plant; auxiliaries two General Motors (Cleveland type) diesels started by Ingersoll-Rand air motors; one 60-kw. G.M. (Detroit) electric starting motor off Willard battery. Jacuzzi and Fairbanks-Morse pumps powered with Master motors.

FOR COOPER-BESSEMER CORP., a new sales representative, Nicholas Brobrick, with office at 4652 Idaho Street, San Diego, to cover the field of marine sales from Monterey south. Having been engaged in diesel engine sales in this territory for 20 years, Mr. Brobrick was formerly with Engine Sales & Service (Los Angeles) and with Crofton Diesel Engineering Co.

. . . and now please turn to page 86 . . .

BACHARACH NOZZLE TESTER for LARGE SIZE DIESEL NOZZLES

Check These Features

- ✔ Test Pump 1800 cu/mm capacity; ported design. Leak-proof—plunger is chrome steel, hardened, ground and lapped into pump body.
- ✔ Nozzle-holding Fixture has spring clamps that accommodate nozzles of different shank diameters. Nozzle is simply "snapped" into position between the clamps.
- ✔ Fuel Supply Reservoir (2.5 pint capacity) of durable, transparent plastic; fuel level can be easily observed.
- ✔ Micronic-type Filter is noted for its superior cleaning efficiency; is easily replaceable.

Get full particulars—Write for Leaflet 628.

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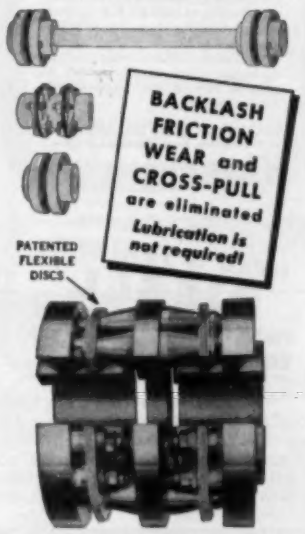
7000 Bennett Street • Pittsburgh 8, Pa.

THOMAS Flexible ALL METAL COUPLINGS
FOR POWER TRANSMISSION REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

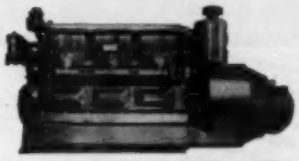
Specialists on Couplings for more than 30 years



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.



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THOMAS FLEXIBLE COUPLING CO.
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GENERATORS
A.C. and D.C.

Columbia, with its years of experience, brings to you a wide line of performance proved, sturdily built, A.C. and D.C. Generators. A.C. Generators: 6¼ to 1000 KVA. D.C. Generators and Exciters: 2 to 300 KW. Available in Single or Two Bearing Construction. *Write today for information. Our engineers will be glad to review your requirements. Prompt delivery.*

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NEED A TRAINED
DIESEL
TRACTOR AND HEAVY
EQUIPMENT MAN?

We have lists of trained Diesel, Tractor, and Heavy Equipment operators, service men, and mechanics available for employment throughout the country. If you have need of such a man we will be glad to furnish complete information without obligation to you. Write to

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THE LANOVA COMBUSTION SYSTEM*

The controlled rotary turbulence of the Lanova Combustion System gives a Diesel many advantages, such as:
- High combustion efficiencies
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Be combustion-wise and economize. Specify Lanova in your next Diesel.

Lanova Corporation, 38-19 30th St., Long Island City 1, N. Y.

*Available only in Diesels manufactured by Lanova licensees. Send for names of these leading engine builders.

THE HEART OF THE DIESEL

LANOVA *makes Diesels purr*

West Coast News

. . . continued from page 85 . . .

CONVERTED from freezership to tuna clipper under supervision of Jas. Evans, port engineer of the Peninsula Packing Co., Seattle—*Sea Lark* converted ATR is propelled by an 1,800-hp. Fairbanks-Morse diesel, two Superior diesels for auxiliaries (started by Ingersoll-Rand air motors), also a GM diesel-generating unit.

FROM Engine Sales & Service, Los Angeles, for U. S. Lime Products Co., Apex, Nevada, an ME6 135-hp. Murphy diesel to repower an 80-D Northwest shovel used in lime rock mining.

THE first Waukesha diesel engine powered Sterling truck received in Southern California (by Sterling Truck Co., Los Angeles), is a 72,800-lb. capacity, 3-axle, dual drive job, powered with Model 148-DK, 6-cyl. 138-hp. unit; sold to Willard C. Olsen, Los Angeles, who does lease-hauling to Oregon-Washington points for West Coast Fast Freight, Inc.

INSTALLED by Shepherd Diesel Marine, Los Angeles, a new 80-hp. Caterpillar diesel, with 3:1 Twin Disc reduction and clutch, in fishing boat *Sunny*, Bill Odette, Newport Beach.

FROM Thomas A. Short Co., San Francisco, for repowering—D3400 Caterpillar marine diesels—for Monterey fishing boat owners L. Stagnaro (also a Twin Disc front power takeoff), Frank Mercurio, and Peter Vermi, and Constantino Burlesci; all engines also equipped with new Snow-Nabstedt reverse and reduction gears.

THE large San Diego fishing fleet (principally diesel-powered), according to the State Division of Fish and Game, in 1950 delivered a total of 193,418,425 lbs. of tuna, sardines and Pismo clams, with dockside value above $40,000,000.

New shrimp trawler *Buen Vecino,* powered with a 3-cylinder, 90-hp. Washington diesel, built by Tacoma Boatbuilding Co. has been delivered to Productos Marinos, S. A., Guaymas, Mexico.

AT THE Continental Oil Co., generating plant, Sussex, Wyoming, three new 460-hp. Worthington natural gas engines driving Electric Machinery generators have Engineering Controls' Vapor Phase units for engine cooling, with the waste heat converted into low pressure steam to heat the air in the buildings.

PURCHASED by Barnsdall Division, Sunray Oil Corp., five 660-hp. Clark 2-cylinder natural gas engine driven compressors for maintenance of oil pressure at the new unitized natural gasoline plant, at Guijarral Hills field in Fresno County, Calif.

LINDA D., 37-ft. bait boat, owner Nick Delaney, Laguna Beach, to work out of San Diego, repowered by Shepherd Diesel Marine, Los Angeles, with a 40-hp Caterpillar marine diesel; also new Twin Disc gear.

CUMMINS diesel-powered trucks recently put into service: For Pacific Freight Liness, 11 Cab-

FOR COMPLETE PURIFICATION OF USED OIL

The Hoffman Oil Conditioner saves lube oil by removing solubles and insolubles—saves costly engine maintenance costs. Capacities of 50 to 800 g.p.h. Write for Bulletins A-687 and A-688.

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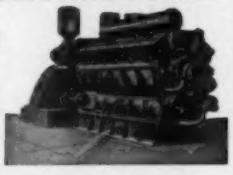
DIESEL ELECTRIC POWER
for IMMEDIATE SHIPMENT



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4
H. P.
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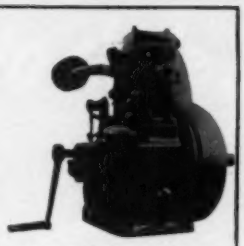

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ELECTRIC
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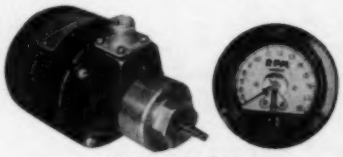
Simplified RUGGED Design!



Precision at Low Cost!
A quality precision tachometer unit engineered to your specifications with scales calibrated to your requirements. Elimination of wearing parts assures sustained accuracy. Non-directional or indicating forward and reverse.
PRICE: $36.00 AND UP
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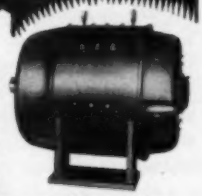
AC DC KURZ & ROOT GENERATORS



AC and DC self-excited and self-regulated designs; available—two bearing; single bearing; direct-connected; single bearing quill mounted, in a wide speed range, sealed prelubricated bearings, direct cranking winding 1 to 100 K.W. range.
Write for Details
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INT. UD-24 POWER UNIT
Long skidbase, outboard bearing, power take-off shaft, starter. New Guarantee.
EDWARD EHRBAR, INC.
29 MESEROLE AVENUE, BROOKLYN 22, N. Y.

Over-Engine Kenworth tractors, 225-hp.; Western Truck Lines, nine Sterling trucks, 220-hp.; Oil Transport Co., two Autocar, one Peterbilt trucks, all 200-hp.; Riverside Cement Co., three Autocar trucks, 165-hp.; California Portland Cement Co., two Diamond T trucks, 200-hp.

FOR Puritan Ice Co., Guadalupe, San Luis Obispo County, Calif., a 330-hp. Clark natural gas engine driven ammonia compressor for use in manufacturing ice used principally for refrigerating railroad vegetable cars.

FROM Shore Line Diesel Maintenance Co., Fisherman's Wharf, San Francisco, a 3-cylinder General Motors Diesel to re-power 33-ft. hook-and-line boat *Rocky;* owner, Frank Maniscalco, San Francisco.

DESIGNED by Edwin Monk, built by Grandy Boat Co., Seattle, Alaska seiner 45-ft. *Shafto* for Demmert and Roberts, Klawock, Alaska, powered with 80-hp. Caterpillar Marine diesel installed by N. C. Marine, Seatle.

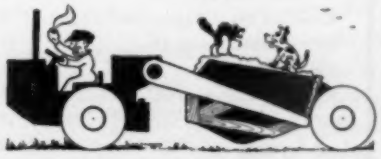
JUST completed by Hallett Manufacturing Co., diesel engine builders of Inglewood, Calif., an additional 10,000 sq. ft. of manufacturing space with a new 7,500 sq. ft. office building soon to follow.

INSTALLED by Crofton Diesel Engineering Co., San Diego, a Model 4061A General Motors diesel with Ingersoll-Rand air starter, driving a 40-kw. Westinghouse auxiliary motor, in luxurious 168-ft. yacht *Haida* with steel hull, aluminum superstructure, owned by Max C. Fleischman, Glenbrook, Nevada.

SOLD by Cummins Service and Sales to Wagner-Morehouse, Los Angeles, for export, 12 Cummins 200-hp. industrial diesel engines for use in unitized oil field drilling equipment.

FOR FISHING boat *Guisippi Padre,* owner Joe Sardina, San Diego, new Crofton 10/2, 2-cycle 10 hp. diesel auxiliary.

A NEW Crofton 2-kw. auxiliary diesel-generating set has just been installed, at the San Diego Crofton headquarters, in the 40-foot yacht *Momona* owned by M. H. Jones, retired lumberman of Portland, Ore.



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• U.E.I. graduates are energetic, ambitious Diesel-thinking men.

Our thorough practical training in operating, maintaining and repairing of Diesel equipment gives these graduates sound fundamentals . . . couple this to their faith in Diesel's future, and you have the kind of men you want to grow with you.

Such men are available for any part of U. S. and Canada. Just let us know your needs.

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5 RANGES IN ONE INSTRUMENT
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FOR DETAILS WRITE FOR BULLETIN NO. 750.

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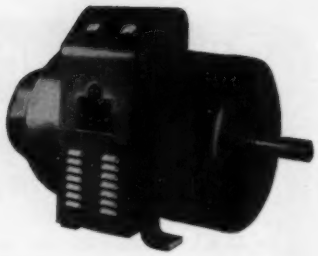
NEW
PETROMETER
FOR ALL TANKS
FOR ALL LIQUIDS
FOR ALL DEPTHS
FOR ALL DISTANCES
PETROMETER CORPORATION

Insist on VELLUMOID for Quality
THE STANDARD SHEET PACKING
FOR OIL, WATER AND GASOLINE



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Combining meters, exciter, generator and voltage regulator in a compact unit, Packaged Generators are an original E-M development. Ratings range from 3.75 to 187 kva.

Our publication *Synchronizer 27* is packed with illustrations of on-the-job applications of this E-M packaged power. Send for a free copy.

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Minneapolis 13, Minnesota

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For Fuel Transfer
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These compact, precision-built internal gear rotary pumps are recognized throughout the diesel industry for quiet operation, leak-free performance, low power consumption and long life.

This Tuthill Model L pump is available with either single or double-end motor in capacities from .33 to 3 g.p.m. and pressures up to 400 p.s.i.

Write for Tuthill Model L Bulletin

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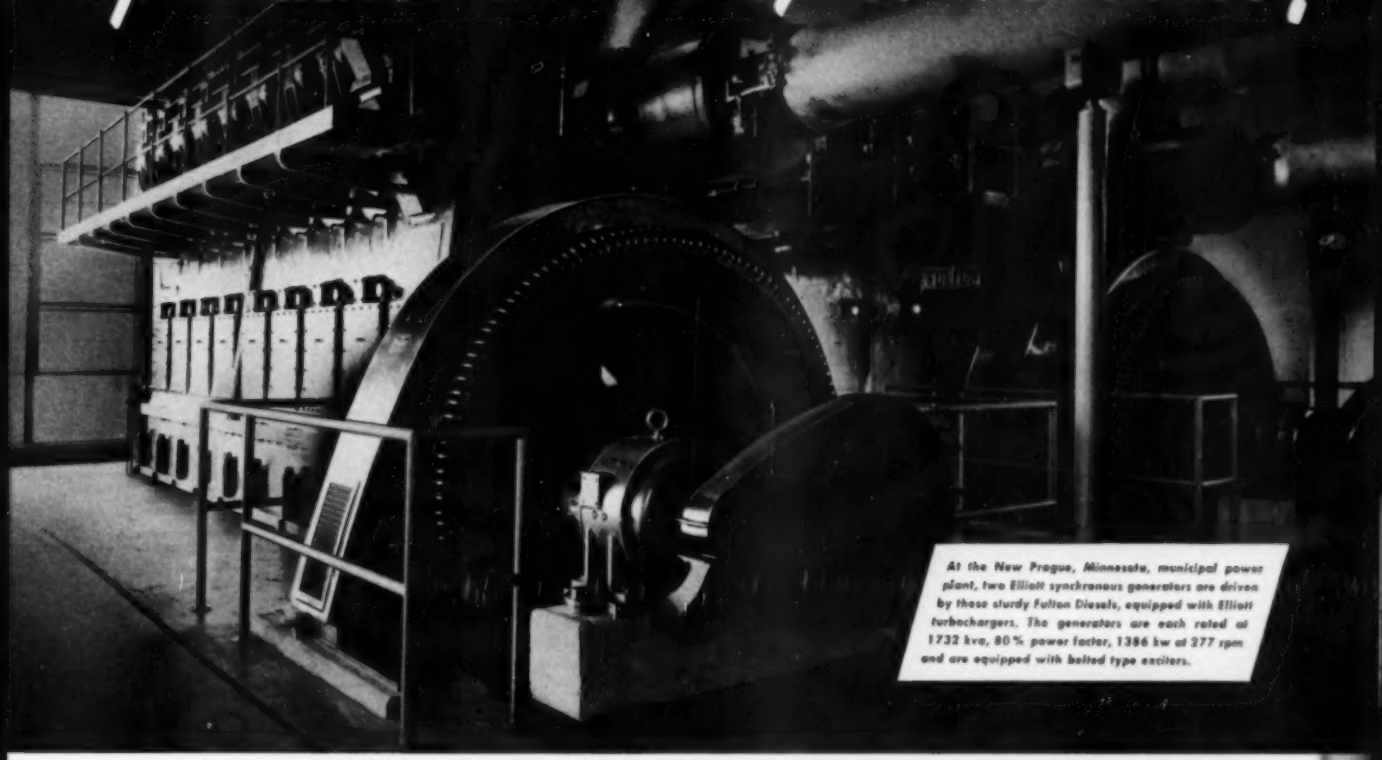

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in this picture

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A beautiful painting of the 8-year-old towboat "Celeste" hangs in the private office of C. C. Rockenback, president of Southern States Barge Line. The above reproduction doesn't do it justice. Likewise neither original nor reproduction can portray the wonderful record of performance this boat has hung up.

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